

## **SECTION 4**

**WEST JACOBS RANCH LBA TRACT**

## **S4-1 TOPOGRAPHY AND PHYSIOGRAPHY**

The general analysis area for the West Jacobs Ranch tract is located in the northern portion of the general Wright analysis area. The LBA tract is bound by the Hilight Road and BNSF & UP railroad on the east and State Highway 450 on the south. The topography of the tract's general analysis area, like the area within the adjacent Black Thunder and Jacobs Ranch mines' existing permit areas, is relatively subdued. The landscape consists primarily of gently rolling terrain of moderate relief influenced by North Prong Little Thunder Creek and its tributaries, Dry Fork Little Thunder Creek, School Section Draw, and a number of unnamed ephemeral draws. A ridgeline of higher bluffs, which forms the headwaters of North Prong Little Thunder Creek and is the origin of its tributary draws, lies along the northwestern boundary of the general analysis area for the West Jacobs Ranch LBA Tract. Some internally-drained ephemeral streams and playas have formed in the lowest portion of non-contributing drainage areas as well.

Elevations range from 4,737 feet to 4,973 feet within the LBA tract as applied for, from 4,737 feet to 5,060 feet within the BLM study area, and from 4,737 feet to 5,080 feet within the tract's general analysis area. Slopes within the LBA tract as applied for range from flat up to about 20 percent, while slopes within the tract's general analysis area range from flat to over 56 percent along the ridgeline that borders the northwestern edge of the BLM study area. The slopes of the gently rolling uplands, which comprise most (about 75 percent) of the general analysis area, seldom exceed 5 percent.

## **S4-2 GEOLOGY**

Stratigraphic units in the general analysis area include, in descending order, recent (Holocene age) alluvial and eolian deposits, the Eocene age Wasatch Formation (the overburden), and the Paleocene age Fort Union Formation (which contains the target coal beds).

The majority of the recent surficial deposits in the general analysis area are reworked Wasatch Formation residuum or deposits that are of mixed alluvial and eolian nature. The lithologies of these unconsolidated deposits represent materials eroded locally from the Wasatch Formation and reflect relatively near-source deposition. There are thin alluvial deposits along ephemeral streams and closed basin drainage channels. These alluvial deposits typically consist primarily of poorly to well-sorted, irregularly bedded to laminated, unconsolidated sand, silt, and clay with minor intervals of fine gravel. Eolian processes have reworked some of the surficial sands and silts, resulting in isolated deflation basins having no natural drainage. These internally-drained surface features (playas) commonly contain fine-grained sediments recently deposited from seasonal rainfall or snowmelt runoff events.

The Eocene Wasatch Formation forms most of the overburden in the general analysis area. The Wasatch consists of interbedded, lenticular sands/sandstones, silts/siltstones, clays and shales with thin discontinuous

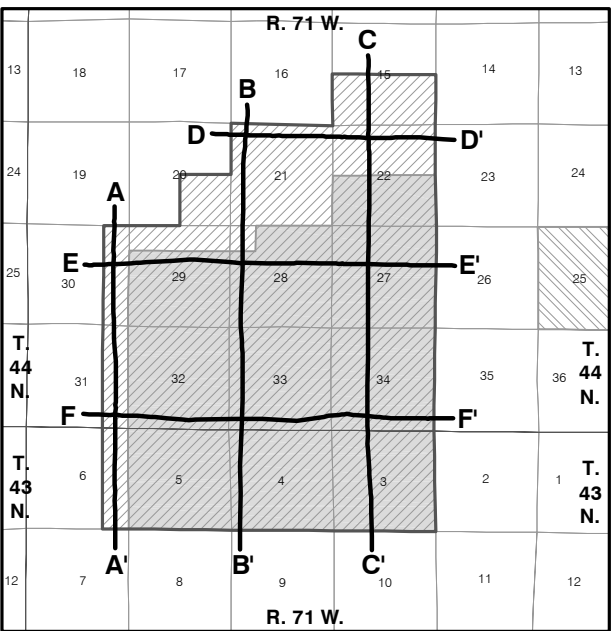
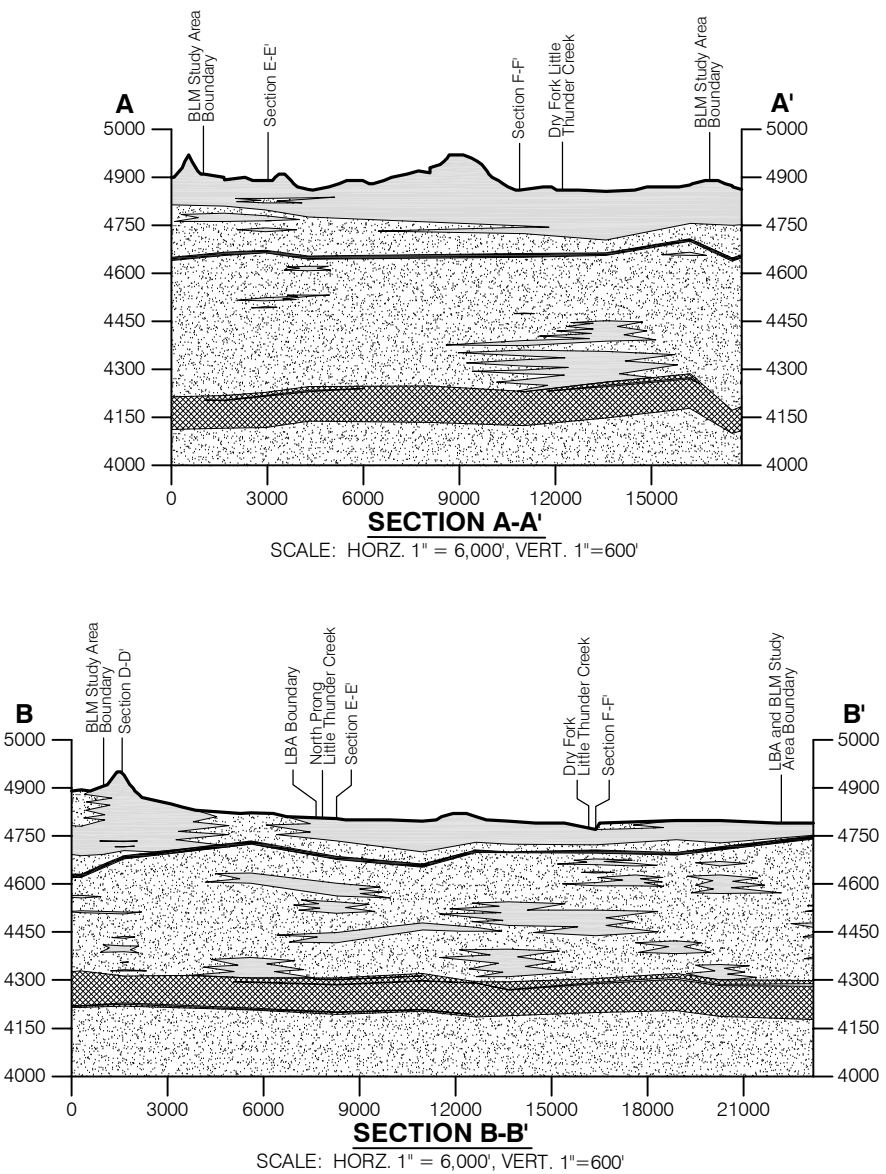
coal seams. Typically, units are gradational mixtures of these sediments. The top of the Wasatch in the tract's general analysis area is dominated by sandy deposits that are continuous throughout the area and thicken slightly to the north and west. These sands are commonly unconsolidated, especially near the surface, but can also be indurated where they are hardened by cementation. Below these surficial sandy deposits fine-grained deposits dominate the Wasatch, with sand bodies occurring more as discontinuous lenses. There is no distinct boundary between the Wasatch Formation and the underlying Paleocene Fort Union Formation. From a practical standpoint, however, the top of the mineable coal zone is considered as the contact between the two formations. The average overburden thickness, which includes the recent surficial deposits, is 475 feet in the LBA tract as applied for, and 486 feet in the BLM study area (the tract configured under Alternative 2).

Wasatch rocks crop out on the surface in some locations, particularly along steeper slopes formed by the more erosionally resistant strata and along the breaks or the broken land dissected by small ravines and gullies. The Wasatch Formation also outcrops along the steep hill sides and bluffs in the northwestern and western-most portions of the LBA tract's study area. Outcrops range from prominent sandstone bluffs to more subdued outcrops of shaley material that exhibit more weathering and erosion. Scoria (also called clinker or burn) occurs in the northeast portion of Section 21, and in the east half of Section 31, T.44N., R.71W. Scoria is sediment that was baked, fused or melted in place when the underlying coal burned in-situ, and is often exposed as reddish-brown, resistant rock outcrops.

A Wasatch coal seam, termed the "rider seam," is present throughout most of the LBA tract at about 4,600 to 4,800 feet elevation (roughly 200 feet stratigraphically above the mineable Fort Union Wyodak coal seam), but is absent in the eastern and northeastern portions of the area. The rider seam, which is about 10 feet thick, will most likely not be mined. Other Wasatch coals, where present, are typically of no economic significance.

Underlying the Wasatch Formation is the Paleocene Fort Union Formation. There is one mineable seam (referred to as the Wyodak) in the BLM study area for the West Jacobs Ranch LBA Tract. The average mineable coal seam thickness is 102 feet in the tract as applied for and 104 feet in the BLM study area. Thin partings up to a few feet thick in this coal are relatively common and continuous, and consistently occur near the top and bottom of the seam. Table S4-1 presents the average thickness of the overburden and the Wyodak coal seam for the West Jacobs Ranch LBA Tract. Figures S4-1, S4-2, and S4-3 depict six geologic cross sections (three north-south and three east-west) drawn through the LBA tract's BLM study area.

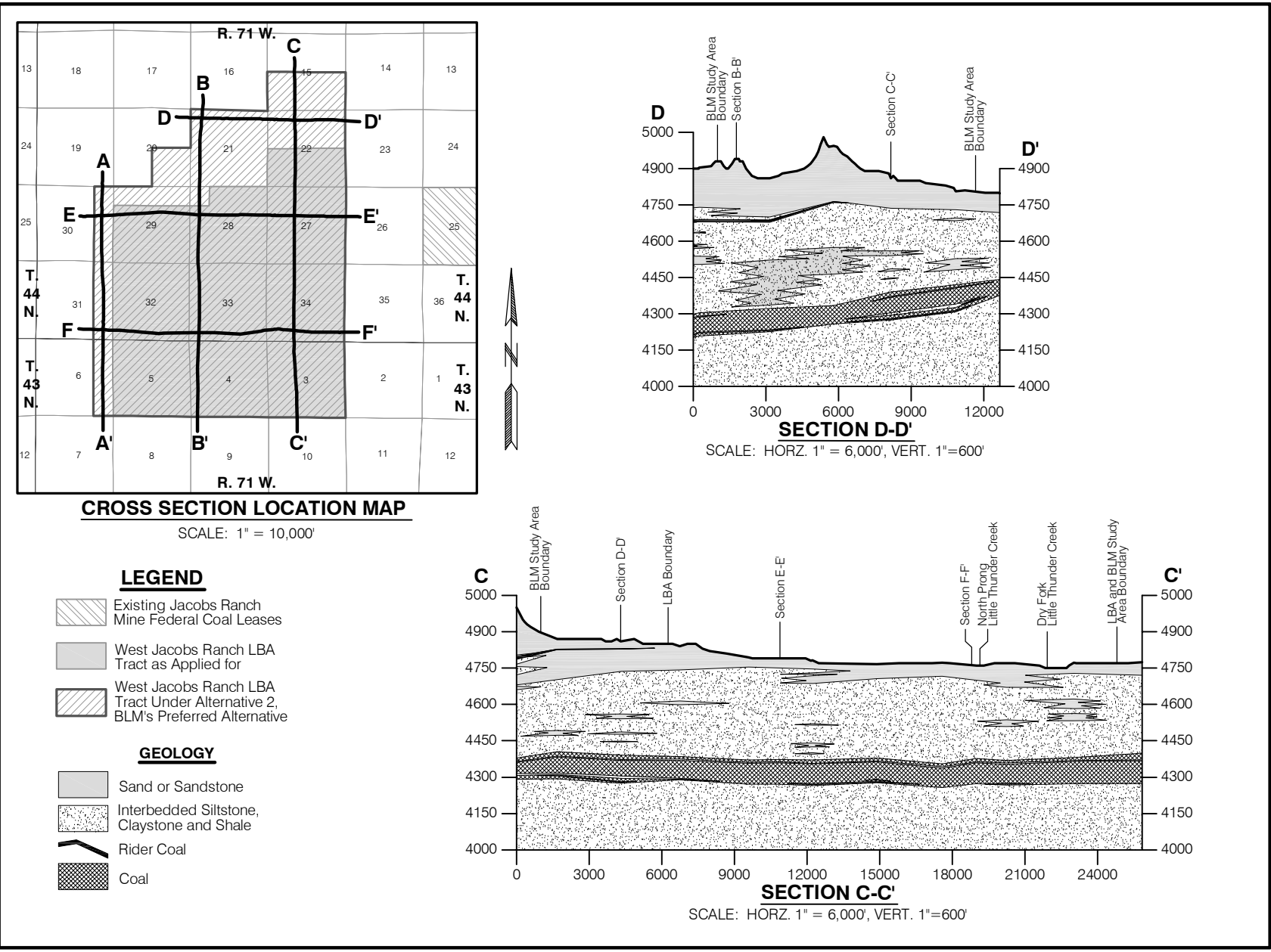
The Fort Union coal seams are subbituminous and are generally low-sulfur, low-ash coals. Typically, the coal being mined in the PRB has a lower heating value and higher sulfur content north of Gillette than south of Gillette. For the West Jacobs Ranch LBA Tract, Jacobs Ranch Coal Company estimates the

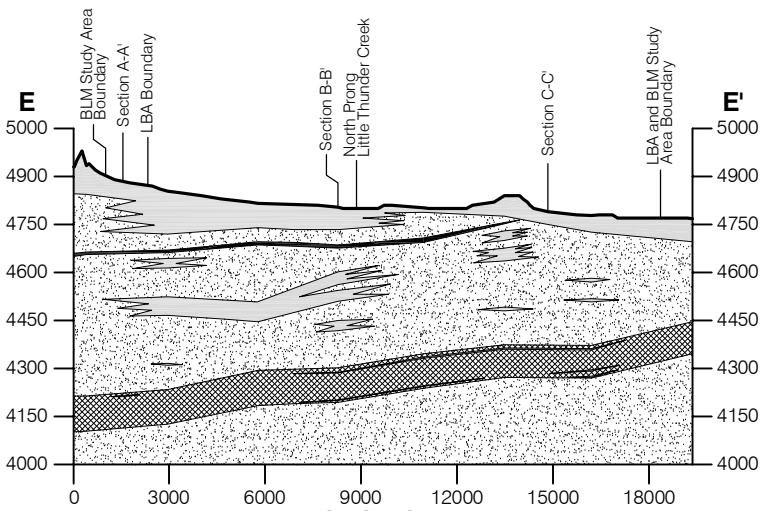


- LEGEND**
- Existing Jacobs Ranch Mine Federal Coal Leases
  - West Jacobs Ranch LBA Tract as Applied for
  - West Jacobs Ranch LBA Tract Under Alternative 2, BLM's Preferred Alternative
- GEOLOGY**
- Sand or Sandstone
  - Interbedded Siltstone, Claystone and Shale
  - Rider Coal
  - Coal

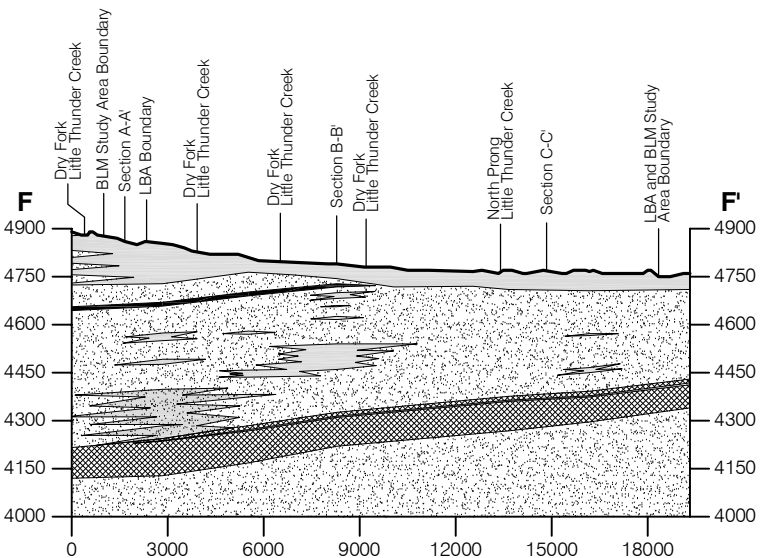
Figure S4-1. Geologic Cross Sections for the West Jacobs Ranch LBA Tract.

Figure S4-2. Geologic Cross Sections for the West Jacobs Ranch LBA Tract.

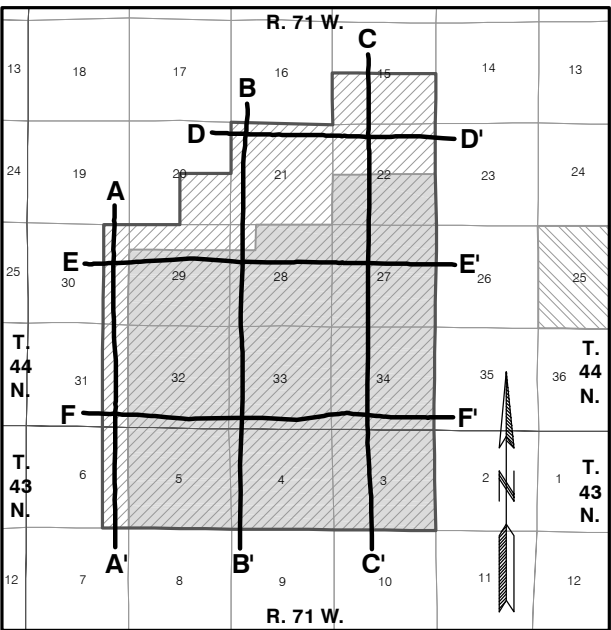




SCALE: HORZ. 1" = 6,000', VERT. 1"=600'



SCALE: HORZ. 1" = 6,000', VERT. 1"=600'



CROSS SECTION LOCATION MAP

SCALE: 1" = 10,000'

### LEGEND

- Existing Jacobs Ranch Mine Federal Coal Leases
- West Jacobs Ranch LBA Tract as Applied for
- West Jacobs Ranch LBA Tract Under Alternative 2, BLM's Preferred Alternative

### GEOLOGY

- Sand or Sandstone
- Interbedded Siltstone, Claystone and Shale
- Rider Coal
- Coal

Figure S4-3. Geologic Cross Sections for the West Jacobs Ranch LBA Tract.

Wyodak coal's ash content at about 4.5 percent, the sulfur content at about 0.25 percent, and the average heating value at approximately 8,750 to 8,900 British thermal units per pound (Btu/lb).

Table S4-1. Average Overburden and Coal Thicknesses in the West Jacobs Ranch LBA Tract.

<b>Mining Unit</b>	<b>Proposed Action (ft)</b>	<b>Alternative 2 (ft)</b>
Overburden	475.0	486.0
Coal	102.0	104.0
Interburden	0.0	0.0

### **S4-3 PALEONTOLOGY**

Although the Eocene Wasatch Formation is known to produce fossil vertebrates of scientific significance in Wyoming, outcrops of the Wasatch Formation in the PRB are not generally well exposed and the conditions of deposition of the formation have contributed to a low preservation potential for fossils.

Geologic mapping by the U.S. Geological Survey and Wyoming State Geological Survey have documented that the general Wright analysis area is underlain by sedimentary deposits of the Wasatch Formation. Geologic maps depict bedrock units that would occur at the surface in the absence of recent, unconsolidated colluvial and eolian deposits that occur widespread over the general analysis area. These surficial materials in the general Wright analysis area are derived primarily from the underlying bedrock, which consists mainly of soft shale, sandstone and coal beds, and most of these rocks weather to fine-grained material. The physical properties of the weathered materials depend largely on the mode of transportation and deposition, whether by water, gravity, or wind that account for the position of the weathered materials. Actual outcrops of the Wasatch Formation that could be prospected for fossils occur infrequently in the general Wright analysis area and are found most commonly in areas having the steepest slopes. The landscape of the West Jacobs Ranch LBA Tract is predominantly rolling sagebrush shrubland and grassland and not particularly well suited to paleontological exposure. However, substantial areas of resistant Wasatch bedrock crop out and form the ridgeline along the northwestern boundary of the tract's general analysis area.

Vertebrate fossils that have been described from the Wasatch Formation include mammals such as early horses, tapiroids, condylarths, primates, insectivores, marsupials, creodonts, carnivores, and multituberculates; reptiles such as crocodilians, alligators, lizards, and turtles; birds; eggs; amphibians; and fish. Non-marine invertebrates such as mollusks and ostracods have also been described from the Wasatch.

Fossil plant material is common in the Wasatch Formation. The fossil plants inventoried are primarily leaves and fossilized wood. The leaves usually occur as lignitic impressions in sandstone and siltstone and as compact masses in shale. Leaves are the most abundant fossils found during paleontological

surveys and are frequently encountered during mining operations. Fossilized wood often occurs near the top of a coal seam, in carbonaceous shale or within channel sandstone. Exposures of fossil logs are common, but usually very fragmentary. Like fossil leaves, fossil logs can be readily collected in the PRB.

Professional archeologists, in effort to locate unique pockets of fossilized bone such as those reported elsewhere in the Wasatch Formation in the PRB, closely examined outcrop localities in conjunction with the intensive pedestrian surveys for cultural resources. Paleontological surveys were conducted in conjunction with the cultural resources inventories of the BLM study area for the West Jacobs Ranch LBA Tract, with the exception of the S½ of Section 15 and the SE¼ of Section 20, T.44N., R.71W., and Section 3, T.43N., R.71W. Due the ubiquitous nature of fossilized tree remains and bivalve fragments in the Wasatch Formation, the recording of fossil locations was confined to unique finds. The only observed fossils were of petrified wood fragments. Fossilized wood and leaves are common and can be observed at many unrecorded locations, particularly in associated with coal outcrops. No Wasatch Formation outcrop localities produced exceptional examples and no unique finds were located within the LBA tract's general analysis area.

## **S4-4 AIR QUALITY**

### **S4-4.1 Existing Emission Sources**

In the vicinity of the West Jacobs Ranch LBA Tract, the main sources of air pollution are surface coal mining activities, vehicular traffic, railroad traffic, and various sources associated with oil and gas production and farming and ranching activities. The closest existing coal-fired power plants to the LBA tract are the Dave Johnston plant (approximately 59 miles south-southwest) and the Wyodak Complex (approximately 48 miles north), which consists of the 90-Mw WyGen No. 1, the 335-Mw Wyodak No. 1, the 21.8-Mw Neil Simpson No. 1, the 80-Mw Neil Simpson No. 2, and two 40-Mw natural gas-fired power plants.

### **S4-4.2 Proposed Emission Sources**

All of the currently proposed emission sources in the eastern PRB are discussed in Chapter 4 of the WAC DEIS document. There are currently 12 pending LBA applications including the West Jacobs Ranch tract. Table S4-2 provides the approximate distances from the West Jacobs Ranch LBA Tract to each of the other 11 pending LBA tracts.



Table S4-2. Distances to Pending LBA Tracts.

<b>LBA Tract</b>	<b>Adjacent Mine</b>	<b>Distance from West Jacobs Ranch</b>
Hay Creek II	Buckskin	47 miles northwest
Caballo West	Caballo	23 miles north
Belle Ayr North	Belle Ayr	22 miles north
West Coal Creek	Coal Creek	10 miles north
Maysdorf II	Cordero Rojo	12 miles north
North Hilight Field	Black Thunder	Proximate
West Hilight Field	Black Thunder	Proximate
South Hilight Field	Black Thunder	Proximate
North Porcupine	North Antelope Rochelle	8 miles south
South Porcupine	North Antelope Rochelle	11 miles south
West Antelope II	Antelope	12 miles south

#### **S4-4.3 Historical Ambient Air Quality: Particulate Emissions**

##### **Emission Producing Activities**

Fugitive particulate (dust) emissions are produced within the mine areas by activities such as coal and overburden blasting, excavating, loading, and hauling and large areas of disturbed land. Stationary or point sources of particulate emissions produced within the mine areas include coal crushing, handling/conveying, and storage facilities.

##### **Monitoring Results**

Wyoming Department of Environmental Quality/Air Quality Division (WDEQ/AQD) requires the collection of information documenting the quality of the air resource at each of the PRB surface coal mines. Each mine was required to monitor air quality for a 24-hour period every six days at multiple monitoring sites through the end of 2001. Beginning in 2002, all PM<sub>10</sub> monitors located at the active mines are required by WDEQ/AQD to sample air quality for a 24-hour period every three days.

In accordance with the Ambient Air Quality Assurance Project Plan, Jacobs Ranch Mine operates a particulate and meteorological monitoring network. Figure 3-4 in the WAC DEIS shows the locations of the mine's particulate (PM<sub>10</sub> and TSP) air quality sampling sites (Site 3, Site 4, and Site 5) and the meteorological monitoring station. The State of Wyoming added PM<sub>10</sub>-based standards in 1989 and retained the TSP standards until March 2000; therefore, the TSP standard is no longer being enforced. The progression of mining operations requires that the location and number of particulate monitors be adjusted in order to provide the best documentation of the

ambient air quality. Jacobs Ranch Mine relocated Site 5 in July 2003, as approved by WDEQ/AQD.

There were no monitored exceedances of the TSP standard at the Jacobs Ranch Mine when TSP was the federally regulated pollutant, and there have been no exceedances of the annual average PM<sub>10</sub>-based standards at the Jacobs Ranch Mine since PM<sub>10</sub> became the federally regulated pollutant. There has been only one exceedance of the 24-hour PM<sub>10</sub>-based standards at the Jacobs Ranch Mine through 2008. That event was associated with winds exceeding 20 mph, which could have qualified as a high-wind event under the Natural Events Action Plan. Prior to 2007, there was no mechanism in place to account for exceedances demonstrated to be the result of natural events. The WDEQ/AQD collaborated with the Wyoming Mining Association (WMA) to develop a Natural Events Action Plan (NEAP) for the coal mines of the PRB, based on EPA Natural Event Policy guidance. Under certain conditions, excessive PM<sub>10</sub> concentrations resulting from dust raised by exceptionally high winds or other natural events will be treated as uncontrollable natural events.

Table S4-3 presents the average annual PM<sub>10</sub> concentrations measured at the mine's three air quality monitoring sites from 1998 through 2008. In effort to relate measured particulate emissions to mine activity, Jacobs Ranch Mine's annual coal and overburden production are included in Table S4-3.

Table S4-3. Summary of Jacobs Ranch Mine Annual Coal and Overburden Production and Particulate Emissions Monitoring Data, 1998 - 2008.

Year	Coal Produced (mmtpy)	Overburden Moved (mmbcy)	Average Annual Particulate Emissions <sup>1</sup>		
			Site 3	Site 4	Site 5
1998	29.1	57.8	N/A	25	15
1999	29.1	82.3	N/A	35	21
2000	28.3	74.1	N/A	36	21
2001	29.3	82.1	13	31	30
2002	31.7	94.7	20	30	25
2003	35.7	108.1	25	18	25 <sup>2</sup>
2004	38.6	110.9	25	17	22
2005	37.3	100.7	29	20	26
2006	40.0	120.9	33	20	28
2007	38.1	132.4	31	17	32
2008	42.1	145.6	30	16	17

<sup>1</sup> PM<sub>10</sub> (in µg/m<sup>3</sup>)

<sup>2</sup> Site was moved July 2003

Source: EPA (2009b), Shamley (2008a)

## Control Measures

The WDEQ/AQD requires the use of Best Available Control Technology (BACT) on all sources of emissions in the State of Wyoming. Jacobs Ranch Mine practices control measures that are applicable to surface mining operations, which are outlined in Section 14 of the Wyoming Air Quality Standards and Regulations (WAQSR).

Fugitive emissions are controlled with a variety of methods that the agency considers BACT. Section 3.4.2.3 in the WAC DEIS addresses a variety of dust control measures that WDEQ/AQD requires for all surface coal mines in the PRB. Additional site-specific requirements related to mine-specific layout and mining practices may be included in the individual mine's air quality permits, examples of which are also given in the WAC DEIS. The WDEQ/AQD has issued several new air quality permits modifying Jacobs Ranch Mine's air quality controls/operating procedures, and on January 22, 2007, WDEQ/AQD issued air quality permit MD-1005A2 to modify the Lands Necessary to Conduct Mining boundary. Permit MD-1005A2 was the second amendment to Permit MD-1005, which was issued on July 26, 2004 (JRM 2007).

### **S4-4.4 Historical Ambient Air Quality: NO<sub>2</sub> Emissions**

#### Emission Producing Activities

Vehicular traffic, both inside and outside the areas of mining, is responsible for tailpipe emissions. Exhaust emissions from large-scale mining equipment, emissions from compressor engines used in the production of natural gas, emissions from railroad locomotives, and coal-fired power plant emissions all contain oxides of nitrogen (NO<sub>x</sub>). Tailpipe emissions consist primarily of nitrogen dioxide (NO<sub>2</sub>), carbon monoxide (CO), and volatile organic compounds (VOCs), but may also include sulfur dioxide (SO<sub>2</sub>) and other trace constituents. Overburden blasting also sometimes produces gaseous orange-colored clouds that contain NO<sub>2</sub>. NO<sub>2</sub> is one of several products resulting from the incomplete combustion of the explosives used in the blast.

#### Monitoring Results

NO<sub>2</sub> monitoring results are available from several currently-active air quality monitoring stations in the eastern PRB, including the Thunder Basin National Grasslands Site, located approximately 63 miles north of the Jacobs Ranch Mine; the Campbell County site, located approximately 30 miles north-northwest of the Jacobs Ranch Mine; and the Tracy Ranch Site, located approximately 5 miles south of the Jacobs Ranch Mine. WDEQ/AQD and the Black Thunder Mine (Tracy Ranch site only) maintain these air quality monitoring stations. The monitoring data that have been gathered from these sites, as well as other sites that are no longer monitored, are included in Section 3.4.3 of the WAC DEIS.

## Control Measures

To date, there have been no reported events of public exposure to NO<sub>2</sub> from blasting activities at the Jacobs Ranch Mine. The WDEQ has not required the mine to implement any specific measures to control or limit public exposure to NO<sub>2</sub> from blasting, although several of the surface coal mines the PRB, including Jacobs Ranch, have instituted voluntary blasting restrictions to avoid NO<sub>x</sub> impact to the public. Section 3.4.3.3 in the WAC DEIS includes additional information. There have been no incidents of public exposure in the southern PRB reported to the WDEQ for the past 4 years.

## **S4-5 WATER RESOURCES**

West Jacobs Ranch LBA Tract is adjacent to the Black Thunder and Jacobs Ranch mines' existing permit areas; therefore, both the regional and site-specific baseline water resources around and within the West Jacobs Ranch LBA Tract are extensively characterized in the mines' Wyoming Department of Environmental Quality/Land Quality Division (WDEQ/LQD) mine permits (TBCC 2005, JRCC 2004). The following analysis is based largely on those findings.

### **S4-5.1 Groundwater**

The West Jacobs Ranch LBA Tract overlies three geologic water-bearing strata that have been or would be directly affected by mining. In descending order, these units are the recent alluvial deposits, the Wasatch Formation overburden, and the Fort Union Formation Wyodak coal seam that will be mined. The underlying Tullock member of the Fort Union Formation and the Lance Sandstone aquifers are regionally utilized for municipal, industrial, and domestic water supplies, including the water supply for the nearby Town of Wright. These lower hydrostratigraphic units will not be directly disturbed by mining. Baseline hydrogeologic conditions within and around the Jacobs Ranch and Black Thunder mines are characterized in the WDEQ/LQD mine permits (TBCC 2005, JRCC 2004), and ground water monitoring data (depth to water and water quality) are included in the mines' WDEQ/LQD annual reports. Jacobs Ranch and Black Thunder mines' current ground water monitoring programs are addressed in their 2007 Annual Reports (JRCC 2007, TBCC 2007), and Figures 3-20 and 3-21 in the Wright Area Coal Leases Draft EIS (WAC DEIS) depict the locations of the mines' currently active monitoring wells.

### Recent Alluvium

The West Jacobs Ranch LBA Tract is within the Little Thunder Creek watershed. North Prong Little Thunder Creek and Dry Fork Little Thunder Creek, ephemeral tributaries to Little Thunder Creek, drain most of the LBA tract. Recent alluvial deposits associated with surface drainages within the tract's general analysis area are generally very thin and not laterally extensive enough to be considered aquifers. Recent alluvium exhibiting any potential of

a groundwater resource is limited to stream laid deposits in ephemeral drainages. These unconsolidated deposits are typically very fine-grained and have very limited permeabilities, precluding any significant storage and movement of groundwater (TBCC 2005). Surficial geology mapping by JRCC (1994) and the U.S. Geological Survey (Reheis and Coates 1987, Coates 1978a and 1978b) shows that the only alluvial deposits within the LBA tract's general analysis area occur along the channels of Dry Fork Little Thunder Creek and its tributary, Brater Draw, in Sections 3 and 4, T.43N., R.71W. and Section 33, T.44N., R.71W. (Figure S4-4). These alluvial materials are comprised of stream-channel and overbank deposits.

Groundwater occurrence in the alluvium within the LBA tract is largely unknown at present, although based on the limited areal extent of the deposits, only seasonal yield is expected as bank storage from ephemeral stream flows. Characterization of alluvial groundwater in the North Prong Little Thunder Creek just downstream of the LBA tract by TBCC (2005) revealed a hydraulic conductivity (a measure of the ability of the aquifer to transmit groundwater) ranging from 0.52 to 6.42 feet per day (ft/day), indicating a moderately conductive alluvium. Ten monitoring wells installed to characterize alluvium at Black Thunder Mine exhibited an average total dissolved solids (TDS) concentration of about 1,600 milligrams per liter (mg/L), which indicates the water is suitable for agriculture and livestock use.

#### Wasatch Formation

Within the Powder River Basin (PRB), the Wasatch Formation (the strata lying above the mineable coal, also called the overburden) consists of non-marine, fluvial and eolian deposits of interbedded sands, silts, and clays with occasional discontinuous deposits of coal, carbonaceous material, and clinker. This description basically holds true for the area within and around the West Jacobs Ranch LBA Tract. Within about 100 feet of the surface, the overburden is dominated by sands that are continuous throughout the LBA tract's general analysis area. Regional groundwater levels in the overburden however are generally lower than these surficial sands, rendering them generally dry and ineffective as a groundwater resource. Some limited groundwater may occur in these shallow sands where the groundwater is locally perched on low-permeability deposits.

Below these surficial sands, finer-grained deposits (siltstones and claystones) dominate the Wasatch, with sand bodies occurring less frequently as discontinuous lenses. Based on groundwater occurrence and elevations determined by groundwater monitoring at Jacobs Ranch Mine, any of these deposits in the mid- to lower-Wasatch sequence may be water bearing, although the sands and sandstones have a greater potential for groundwater yield. The discontinuous nature of the deposits produces considerable variability in groundwater elevations both laterally and vertically. The hydraulic connection between sandy lenses is tenuous due to the dominance of the relatively low-permeability deposits. Groundwater movement through the Wasatch Formation overburden is therefore likely limited. Although the water-bearing sands within the Wasatch Formation are not continuous and not

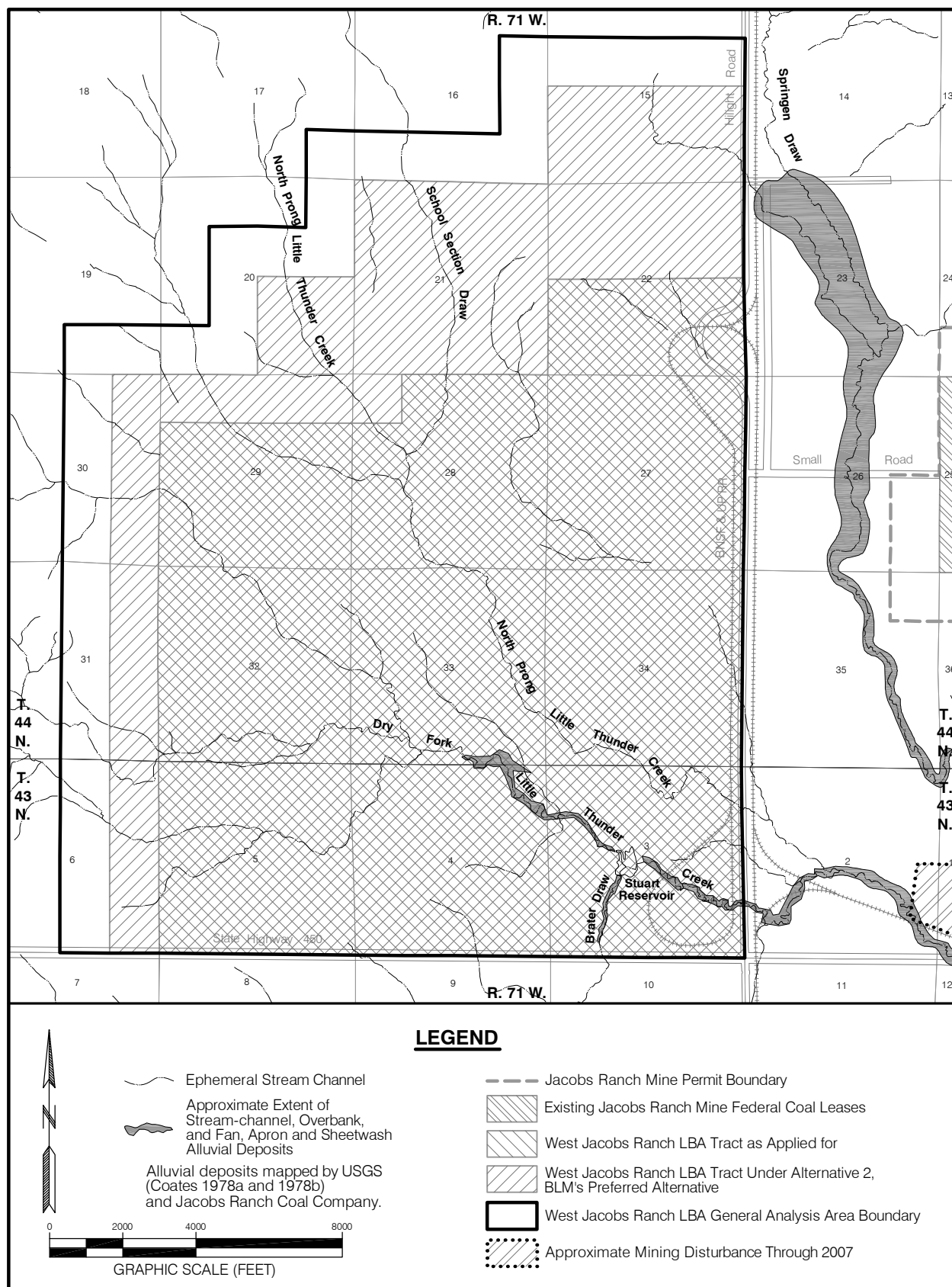


Figure S4-4. Stream Laid Deposits Within and Adjacent to the West Jacobs Ranch LBA Tract.

considered to be a regional aquifer, the sands may provide limited amounts of groundwater for livestock and domestic uses on a local scale, provided the water quality is suitable.

Another geologic unit that may be considered a part of the Wasatch Formation is scoria, also called clinker or burn. It consists of sediments that were baked, fused, and melted in place when the underlying coal burned spontaneously. These burned sediments collapsed into the void left by the burned coal. Scoria deposits can be a very permeable aquifer and can extend laterally for miles in the eastern PRB. The occurrence of scoria is site specific, typically occurring in areas where coal seams crop out at the surface. High hydraulic conductivities for scoria were substantiated at the Black Thunder Mine, where conductivities were estimated at 265,000 to 18 million gallons per day per square foot (gpd/ft<sup>2</sup>). These values indicate a high potential for groundwater yield. Other than providing a viable groundwater resource, the hydrologic function of scoria is to provide recharge to adjacent overburden and coal beds. The scoria outcrops in the northeast portion of Section 21, T.44N., R.71W. and in the east half of Section 31, T.44N, R.71W. may provide such a hydrologic function in a localized manner, but are not documented as viable aquifers in the LBA tract's general analysis area.

Recharge to the Wasatch Formation is predominately from the infiltration of precipitation and lateral movement of water from adjacent scoria bodies where present. Regionally, groundwater is discharged from the Wasatch Formation by evaporation and transpiration, pumping wells, vertical leakage into the underlying coal seams, drainage into mine excavations, and seepage into the overlying alluvium along stream courses. Overburden in the vicinity of the LBA tract is recharged naturally by precipitation infiltration into exposed sand and sandstone bedrock that predominate the surficial deposits and artificially where in-channel reservoirs have been constructed for ranching operations and where coal bed natural gas (CBNG) groundwater is discharged to the surface. Focused, localized recharge occurs from surface water runoff beneath drainages, and probably beneath reservoirs and topographic depressions that collected runoff.

The discontinuous nature of the water-bearing sands and predominance of low-permeability deposits generally render low hydraulic conductivity and low groundwater flow rates in the Wasatch. Testing of overburden monitoring wells at Jacobs Ranch Mine revealed hydraulic conductivities that ranged from 0.003 to 0.07 ft/day; substantially lower than the median reported for the Wasatch in general by Martin et al. (1988) of 0.2 ft/day and Rehm et al. (1980) of 0.35 ft/day. The range determined at Jacobs Ranch Mine is commensurate with the mean value determined by Rehm for siltstone and claystone of 0.007 ft/day.

Groundwater flow in the Wasatch in the vicinity of the West Jacobs Ranch LBA Tract's general analysis area is generally to the west (Hydro-Engineering, 2007). Groundwater directions and gradients typically change near active mine pits, where groundwater commonly exhibits flow toward the excavation with increasing hydraulic gradients.

The quality of groundwater in the Wasatch Formation near the West Jacobs Ranch LBA Tract is variable and generally poor, exhibiting TDS concentrations from around 500 mg/L to 6,000 mg/L, with a mean of about 2,000-4,000 mg/L (Rehm et. al 1980). TDS concentrations measured from overburden monitoring wells at Black Thunder Mine range from about 80 to 5,800 mg/L, averaging about 2,500 mg/L. More than 80 percent of the samples collected from these wells exhibited TDS concentrations that indicate suitability for livestock use. A scoria monitoring well at Jacobs Ranch Mine has exhibited increasing a TDS concentration from about 500 to 2,000 mg/L as groundwater in the scoria has recovered following reclamation activities. The median TDS concentration for the Wasatch Formation for the group of mines located between Gillette and Wright, as calculated by WDEQ/LQD based on 1,109 samples is 2,996 mg/L (Ogle et al. 2005). Based on the analyses of over 1,000 water quality samples collected by the southern PRB mines, including Jacobs Ranch, the median TDS concentration was 2,000 mg/L and the predominant constituents were sodium and sulfate (Ogle and Calle 2006). Overburden groundwater is generally considered to be unsuitable for domestic consumption and irrigation use, but is suitable for livestock and wildlife use.

### Wyodak Coal

The Tongue River Member of the Fort Union Formation contains the mineable coal zone, which is often divided by partings that separate it into two or more units. Thin, continuous partings up to a few feet thick occur relatively consistently near the top and bottom of the seam. The mineable coal zones are variously referred to as the Anderson and Canyon, Roland and Smith, Wyodak-Anderson, Upper and Lower Wyodak, or Wyodak seams. At the Jacobs Ranch Mine it is referred to as the Wyodak coal seam. In the West Jacobs Ranch LBA Tract, the Wyodak seam has an average thickness of approximately 102 feet.

Wyodak coal seams are considered regional aquifers because they are water bearing and laterally continuous across large areas. Historically, Fort Union coal seams have been a source of groundwater for domestic and livestock uses in the eastern PRB. However, due to the regional structural west-northwest dip of 1 to 3 degrees, the coal generally becomes too deep to be an economical source of water within a few miles west of the PRB surface coal mines.

Clays and silts, often carbonaceous in character, commonly occur above the coal, yielding overall confining or semi-confining conditions for the coal aquifer. These confining layers may be breached by sands in some places, creating a hydraulic connection between the overburden and the coal. Fractures in the low-permeability layers above the coal may also allow a connection between the coal and the overburden. In some areas, including portions of Jacobs Ranch Mine, the coal is only partially saturated (JRCC 2004). This type of groundwater occurrence is common in the coal near its eastern outcrop, where the Wyodak coal can vary among dry, unconfined (where the coal seam is not fully saturated), and confined (where the piezometric level is above the top of the coal). This type of variation typically changes to confined/semi-confined westward from the coal outcrops. Recharge to the coal occurs by a



combination of infiltration through the scoria outcrop areas and vertical recharge through the overburden.

Hydraulic conductivity within the coal seams is highly variable and reflective of the amount of fracturing the coal has undergone, as unfractured coal is virtually impermeable. Field tests indicate that the coal has a low to moderate transmissivity with a range of roughly three orders of magnitude, with localized zones of moderately high transmissivity due to increased fracturing. The yield of groundwater to wells and mine pits is smallest where the permeability of the coal is derived primarily from localized unloading fractures. The highest permeability is imparted to the coal by tectonic fractures. These are through-going fractures of areal importance created during deformation of the Powder River structural basin. The presence of these fractures can be recognized by their linear expression at the ground surface, controlling the orientation of stream drainages and topographic depressions. Due to their pronounced surface expression, these tectonic fractures are often referred to as “lineaments”. Coal permeabilities in the vicinity of these lineaments can be orders of magnitude higher than those in the coal fractured by unloading only. Martin et al. (1988) cites a regional hydraulic conductivity for the coal of 0.8 ft/day. Testing at Jacobs Ranch Mine revealed a commensurate range of hydraulic conductivity of 0.01 to 1.6 ft/day.

Recharge to the coal occurs principally by infiltration of precipitation in the clinker outcrop areas along the flank of the eastern PRB. Secondary vertical recharge from the overburden also occurs, but is highly variable. Prior to mining, the direction of groundwater flow within the areally continuous coal aquifer was generally from recharge areas westward into the basin, following the dip of the coal. Groundwater conditions varied from unconfined to confined, depending on the coal elevation and proximity to the outcrop area. Water levels were generally above the top of the coal away from the outcrop.

Groundwater flow in the coal has not been specifically assessed in the West Jacobs Ranch LBA Tract area, but analysis of groundwater flow at Jacobs Ranch Mine prior to mining indicates groundwater flow in the coal to be down dip to the west. The Gillette Area Groundwater Monitoring Organization (GAGMO) has monitored groundwater conditions in the PRB for more than 25 years, including the area in the vicinity of the LBA tract. Their analyses (Hydro-Engineering 2007) includes assessments of groundwater declines from both mining and CBNG development. Groundwater level declines observed near active mining areas prior to 1997 were likely due to mine dewatering alone and the groundwater flow direction within the coal aquifer was typically toward the mine excavations. By 2000, groundwater level decline rates had increased significantly due to impacts associated with widespread CBNG development. These decline rates west of the mines were overlapping with drawdowns caused by mining operations alone. A continuous cone of depression existed around the Jacobs Ranch, Black Thunder, North Antelope Rochelle, Antelope, and proposed School Creek mines due to their closeness to each other and the cumulative drawdown effects from pit dewatering and nearby CBNG discharges. The extent of drawdown in the coal west of the mines that is

attributable to mine dewatering alone cannot be accurately defined because of the predominant impacts to groundwater from CBNG development.

Groundwater elevation contours for the Wyodak coal presented in the 2007 GAGMO report depict groundwater flows to the west, away from the open pits. The combined effect of 10 years of CBNG development and roughly 30 years of mining activities has lowered the static water level within the coal on the eastern side of the LBA tract approximately 200 feet, resulting in complete dewatering of the coal seam in localized areas, particularly near the mine's pits and where the coal seams are structurally highest.

Coal groundwater quality is typically only suitable for livestock and wildlife watering purposes because certain constituent concentrations commonly exceed many suitability criteria for domestic uses, and the water may have a high salinity and sodium hazard, which makes it unsuitable for agricultural uses. Concentrations of individual parameters may exceed the livestock standards at some locations (Ogle and Calle 2006). The composition of groundwater in the coal is fairly uniform and there are no seasonal or long-term trends in composition. The predominant cation is typically sodium, while the predominant anion is typically bicarbonate. Those coal-monitoring wells located closer to the coal-scoria contact along the eastern side of the PRB have greater magnesium, sodium and sulfate concentrations (TBCC 2007). Groundwater in the coal aquifer regionally has TDS concentrations ranging from about 500 to 3,500 mg/L, with a mean TDS concentration of about 1,000 to 3,000 mg/L (JRCC 2004). A median TDS concentration of 952 mg/L was calculated by the WDEQ/LQD for the coal aquifer, based on 832 samples collected from the southern group of PRB mines, including Jacobs Ranch (Ogle and Calle 2006).

#### Subcoal Fort Union Formation

The Fort Union Formation is divided into three members, which are, in descending order: the Tongue River Member, the Lebo Member, and the Tullock Member. The mineable Wyodak Coal occurs at the top of the Fort Union, within the Tongue River Member. The subcoal Fort Union consists primarily of lithified sands and shales, and is divided into three hydrogeologic units: the upper Tongue River aquifer, the Lebo confining layer, and the Tullock aquifer (Law, 1976). Of the three units, the Tullock is the most prolific in terms of groundwater yield.

Mining does not directly disturb the hydrogeologic units below the mineable coal, but many PRB mines have water supply wells completed in Tullock aquifer (Martin et al. 1988). The town of Wright also taps the Tullock Member for its water supply, in addition to the Lance Sandstone that lies below the Fort Union Formation. In a few cases, there have been drawdowns in the subcoal aquifer due to leakage into mine pits, dewatering, and CBNG development (BLM 2001). The upper Tongue River aquifer consists of lenticular, fine-grained sandstone inter-bedded with mudstone. The Lebo confining layer is typically more fine-grained than the other two members and generally retards

the movement of water (Lewis and Hotchkiss 1981). The Lebo confining layer typically separates the Tongue River and Tullock aquifers hydraulically. The Tullock aquifer consists of discontinuous lenses of sandstone separated by interbedded shale and siltstone.

Transmissivity is equal to an aquifer's hydraulic conductivity, or permeability, times the aquifer's saturated thickness, and is used commonly when discussing the hydraulic properties of the subcoal Fort Union Formation where wells are completed by exposing many discrete sand lenses to the well bore. Transmissivities are generally higher in the deeper Tullock aquifer than in the shallower Tongue River aquifer, and many mines in the PRB have water-supply wells completed in this interval (Martin et al. 1988). The average transmissivity for the Tullock is 290 square feet per day (ft<sup>2</sup>/day) (or about 2,200 gpd/ft) (OSM 1984).

The water quality of the subcoal Fort Union Formation is generally good, meeting the standards for domestic use, as well as irrigation and livestock use (Ogle and Calle 2006). TDS concentrations measured in various subcoal Fort Union Formation water supply wells in the eastern PRB range from 250 mg/L to 520 mg/L. Water from the subcoal Fort Union is typically of the sodium-bicarbonate type.

#### **S4-5.2 Surface Water**

The Jacobs Ranch Mine site is situated near the eastern margin of the PRB, which is a broad structural trough that lies between the Big Horn Mountains and the Black Hills. The PRB is drained by three separate drainage systems: the Powder/Little Powder, the Belle Fourche, and the Cheyenne rivers. The Jacobs Ranch Mine and West Jacobs Ranch LBA Tract lie within the Little Thunder Creek watershed, which is a tributary of Black Thunder Creek, which is a tributary of the Cheyenne River. The topography of the Cheyenne River drainage basin is typified by broad, flat, inter-stream uplands and a wide, level expanse of eastward-sloping plains broken by a few isolated buttes.

The majority of streams and draws within the West Jacobs Ranch LBA Tract drain to the North Prong Little Thunder Creek, which flows from northwest to southeast diagonally through the LBA tract and joins the Little Thunder Creek channel roughly 8 miles downstream of the tract. Little Thunder Creek empties into Black Thunder Creek approximately 25 miles east-southeast of the West Jacobs Ranch LBA Tract. The total drainage for Little Thunder Creek is approximately 127 square miles, and the mainstream channel is about 26 miles long. The Little Thunder Creek watershed has a dendritic drainage pattern with an approximate width (north-south) of 11.7 miles and an approximate length (east-west) of 15.3 miles. The relief of Little Thunder Creek's drainage basin is 490 feet from its headwaters to its confluence with Black Thunder Creek.

The most prominent drainages within the West Jacobs Ranch LBA Tract include the North Prong and Dry Fork Little Thunder Creek. School Section Draw and an unnamed draw meet North Prong in Section 28, T.44N., R.71W.

Dry Fork runs through the southern portion of the LBA tract and joins North Prong east of the tract in Section 2, T.43N., R.71W. Figure 3-30 in the WAC DEIS depicts the surface water features within and adjacent to the West Jacobs Ranch LBA Tract.

The landscape is characterized by rolling topography with higher bluffs along the northwestern boundary of the tract that form the origin of many of the draws that enter the tract from the northwest, including North Prong. The topography in the LBA tract is relatively subdued, drainage densities are fairly low, and internally-drained playas are common topographic and hydrologic features. The eastern portion of the tract does not contribute runoff to any stream and playas have formed in the lowest portion of those non-contributing drainage basins that occur in this area. Springen Draw, for example, borders the tract's eastern edge, and it is formed by a relatively large closed basin (over 8,000 acres in size) into which several ephemeral draws drain.

North Prong has a hydraulic gradient of about 24 feet per mile, or 0.0046. Dry Fork has a gradient of about 9.0 feet per mile, or 0.0035.

All streams within and adjacent to the West Jacobs Ranch LBA Tract are ephemeral, responding to precipitation and snowmelt. Runoff is typically of short duration and exhibits temporal patterns similar to precipitation events, although limited bank storage may extend stream flow for longer periods. Streams in the region generally exhibit a low-flow period from October through January, while snowmelt and spring rainfall produce larger flows.

Surface water quality typically varies with flow or season. In general, as streamflow increases the TDS concentration decreases and the total suspended solids (TSS) concentration increases. Due to the sparse vegetative cover and the infrequent occurrence of surface runoff, high TSS concentrations can be expected, especially from high flows caused by thunderstorm events. Some characterization of North Prong has been completed by the operators of Jacobs Ranch and Black Thunder mines. Jacobs Ranch Mine (JRCC 2004) sampled the North Prong in 1976 at two locations about 6 miles downstream of the LBA tract, in the SW $\frac{1}{4}$  of Section 15, T.43N., R.70W. TDS concentrations from these locations were 57 mg/L and 148 mg/L. Black Thunder Mine (T) sampled flows in North Prong at a site about 5 miles downstream of the LBA tract in Section 16, T.43N., R.70W. Those samples, which were collected from 1988 to 1991, indicated TDS concentrations ranging from about 200 to 1,700 mg/L attributed mostly to bicarbonate, sulfate and sodium ions.

North Prong and its tributaries are listed in the WDEQ Surface Water Classification List (WDEQ/WQD 2009) as a Class 3B stream that is not protected for drinking water or as a fishery, but is protected for other aquatic life, recreation, wildlife, agriculture, industry, and scenic value.

There are eleven reservoirs permitted for stock use within the LBA tract. Two of these reservoirs are adjudicated: Thunder Basin No. 1 Reservoir (SE $\frac{1}{4}$  SW $\frac{1}{4}$  of Section 28, T.44N., R.71W.), which receives water from North Prong, and Stuart Reservoir (NE $\frac{1}{4}$  SW $\frac{1}{4}$  of Section 3, T.43N., R.71W.), which impounds

Dry Fork and Brater Draw (Figure 3-30 in the WAC DEIS). Six other apparent reservoirs within the LBA tract that are not listed in Wyoming State Engineer's (SEO's) records are evident on the USGS topographical map and visible in aerial photography.

#### **S4-5.3 Water Rights**

The Wyoming State Engineer's Office (SEO) administers water rights in Wyoming. Water rights are granted for both groundwater and surface water appropriations. Prior to development of water resources associated with energy development, water appropriations (either groundwater or surface water) in the PRB were typically for livestock use.

SEO records were searched for groundwater rights within 3 miles of the BLM study area for the West Jacobs Ranch LBA Tract. This information is required for WDEQ permitting. The summary of the most recent search is provided below. Currently, mining companies and coal bed natural gas (CBNG) development companies hold the majority of the water rights in the search area. A more detailed listing of the non-coal mine related groundwater rights within a 3-mile radius of the LBA tract is presented in Table S4-4.

As of September 2007, there were 1,171 permitted water wells within 3 miles of the BLM Study Area for the West Jacobs Ranch LBA Tract, 231 of which were owned by coal mining companies. The remaining 940 permitted wells, which include 645 wells permitted for uses related to CBNG development, were permitted for the following uses:

- 440 CBNG only
- 181 stock and CBNG
- 117 monitoring
- 76 stock only
- 34 miscellaneous
- 17 domestic and stock
- 14 domestic only
- 9 stock, CBNG, and reservoir supply
- 8 stock, CBNG, and miscellaneous
- 7 miscellaneous and CBNG
- 7 municipal
- 6 industrial
- 6 miscellaneous and reservoir supply
- 6 stock, miscellaneous, dewatering, and reservoir supply
- 3 irrigation only
- 2 miscellaneous and municipal
- 1 dewatering
- 1 miscellaneous, industrial and temporary use
- 1 stock, miscellaneous, monitoring
- 1 industrial and miscellaneous
- 1 test

SEO records were also searched for surface water rights within 3 miles of the LBA tract's BLM Study Area. This information is also required for WDEQ permitting. The rights are tabulated in Table S4-5, and a summary of the most recent search is provided below.

As of September 2007, there were 150 permitted surface water rights within the search area, 33 of which were related to mining. The remaining 117 surface water rights were permitted for the following uses:

- 73 stock
- 3 stock and irrigation
- 2 industrial and temporary use
- 1 fish propagation
- 1 reservoir supply
- 37 not specified

## Supplementary Information on the Affected Environment

Table S4-4. Groundwater Rights for the West Jacobs Ranch LBA Tract.											
Permit	Priority	T	R	S	QQ	Applicant	Facility Name	Status	Uses	Static WL	T.D.
P2976P	6/11/1961	43	70	6	NWSE	MILLS LAND & LIVESTOCK CO., INC.	MILLS #25	PUW	STO	130	260
P5869W	6/22/1970	43	70	6	NESE	RENO LIVESTOCK CORPORATION	HEARTSPEAR 15	PUW	STO,IND,MIS		
P120269W	11/1/1999	43	70	6	NWNW	RIM OPERATING, INC	CBM H #11-06	UNA	STO,CBM	153	301
P120270W	11/1/1999	43	70	6	NWSW	RIM OPERATING, INC	CBM H #13-06	GST	STO,CBM	145	259
P120271W	11/1/1999	43	70	6	SENW	RIM OPERATING, INC	CBM H #22-06	GST	STO,CBM	153	289
P120272W	11/1/1999	43	70	6	SESW	RIM OPERATING, INC	CBM H #24-06	GST	STO,CBM	150	265
P120273W	11/1/1999	43	70	6	NWNE	RIM OPERATING, INC	CBM H #31-06	UNA	STO,CBM	162	300
P120274W	11/1/1999	43	70	6	NWSE	RIM OPERATING, INC	CBM H #33-06	GST	STO,CBM	235	273
P120275W	11/1/1999	43	70	6	SENE	RIM OPERATING, INC	CBM H #42-06	GST	STO,CBM	164	317
P120276W	11/1/1999	43	70	6	SESE	RIM OPERATING, INC	CBM H #44-06	GST	STO,CBM	145	291
P135816W	6/15/2001	43	70	6	SESE	RIM OPERATING, INC	ENL CBM H # 44-06	GST	STO,CBM	145	291
P135817W	6/15/2001	43	70	6	SENE	RIM OPERATING, INC	ENL CBM H # 42-06	GST	STO,CBM	164	317
P135818W	6/15/2001	43	70	6	SENW	RIM OPERATING, INC	ENL CBM H # 22-06	GST	STO,CBM	153	29
P5867W	6/22/1970	43	70	7	NWNE	RENO LIVESTOCK CORPORATION	HEARTSPEAR 13	PUW	STO	7	210
P19254P	9/30/1954	43	70	7	NWSE	KENNETH & SYLVIA REVLAND	REVLAND #2	PUW	STO	-1	36
P31780W	1/7/1976	43	70	7	SWNW	RENO LIVESTOCK CORPORATION	RENO #1	PUW	STO	10.67	110
P31781W	1/7/1976	43	70	7	SENW	WYOMING STATE HIGHWAY DEPARTMENT	RENO #2	PUW	IND,MIS	-1	260
P81595W	1/8/1990	43	70	7	SWSW	JACOBS LAND AND LIVESTOCK	#1 SOUTH CONSOL	UNA	STO	20	100
P120277W	11/1/1999	43	70	7	NWNW	RIM OPERATING, INC	CBM H #11-07	UNA	STO,CBM	156	289
P120278W	11/1/1999	43	70	7	SENW	RIM OPERATING, INC	CBM H #22-07	GST	STO,CBM	156	276
P120279W	11/1/1999	43	70	7	SENE	RIM OPERATING, INC	CBM H #42-07	GST	STO,CBM	134	267
P126215W	6/9/2000	43	70	7	NWNE	RIM OPERATING, INC	CBM H #31-07	GST	STO,CBM	149	270
P128063W	8/4/2000	43	70	7	SESW	RIM OPERATING, INC	CBM H 24-07	UNA	STO,CBM	140	282
P135815W	6/15/2001	43	70	7	SENE	RIM OPERATING, INC	ENL CBM H # 42-07	GSI	STO,CBM	134	267
P9681W	7/13/1971	43	71	1	NENE	BELLE FOURCHE PIPELINE CO.**GLADYS KINGTON NORWOOD	SOUTH HILIGHT #1	PUW	DOM,STO	221	346
P120245W	11/1/1999	43	71	1	NWSW	RIM OPERATING, INC	CBM D #13-01	UNA	STO,CBM	190	376
P120246W	11/1/1999	43	71	1	SESW	RIM OPERATING, INC	CBM D #24-01	GST	STO,CBM	156	359
P120248W	11/1/1999	43	71	1	SESE	RIM OPERATING, INC	CBM D #44-01	UNA	STO,CBM	154	310
P121847W	12/27/1999	43	71	1	SENE	RIM OPERATING, INC	CBM D #42-01	UNA	STO,CBM	137	310
P121848W	12/27/1999	43	71	1	SENW	RIM OPERATING, INC	CBM D #22-01	UNA	STO,CBM	147	345
P123659W	2/28/2000	43	71	1	NWNE	RIM OPERATING, INC	CBM C #31-01	UNA	STO,CBM	180	377
P125923W	5/25/2000	43	71	1	NWNW	RIM OPERATING, INC	CBM D #11-01	UNA	STO,CBM	162	395
P128064W	8/4/2000	43	71	1	NWSE	USDA, NATIONAL FOREST SERVICE** RIM OPERATING, INC	CBM D 33-01R	UNA	STO,CBM	151	326
P132544W	2/8/2001	43	71	1	SWNE	RIM OPERATING, INC	CBM D # 32-01	UNA	MON	196	365
P135820W	6/15/2001	43	71	1	SESW	RIM OPERATING, INC	ENL CBM D # 24-01	GST	STO,CBM	156	359
P19251P	9/30/1954	43	71	2	NWSE	ARK LAND COMPANY	REVLAND #1	UNA	STO	80	147
P48534W	5/29/1979	43	71	2	SWSW	BURLINGTON NORTHERN INC.	MARY ANN #4	PUW	MIS		
P162567W	9/20/2004	43	71	2	NENE	RIM OPERATING, INC.	REVLAND TRUST FEDERAL #41-2-4371	GST	CBM	345	400
P162568W	9/20/2004	43	71	2	SWNE	RIM OPERATING, INC.	REVLAND TRUST FEDERAL #32-2-4371	GSI	CBM		
P162569W	9/20/2004	43	71	2	NESE	RIM OPERATING, INC.	REVLAND TRUST FEDERAL #43-2-4371	GST	CBM	330	383
P3050W	9/15/1969	43	71	3	SWSE	INC. STUART BROTHERS	STUART #10	PUW	STO	60	145
P128467W	8/17/2000	43	71	3	SWNW	LANCE OIL & GAS COMPANY, INC	STUART FEDERAL 12-3-4371	GST	CBM	436	496
P3343W	10/6/1969	43	71	4	SWNE	STUART BROTHERS INC.	STUART #8	PUW	STO	160	273
P118160W	8/6/1999	43	71	4	NWSW	LANCE OIL & GAS COMPANY, INC	STUART 13-4	GST	CBM	294	617
P118161W	8/6/1999	43	71	4	SESW	LANCE OIL & GAS COMPANY, INC	STUART 24-4	GST	CBM	285	571
P118162W	8/6/1999	43	71	4	NWSE	LANCE OIL & GAS COMPANY, INC	STUART 33-4	GST	CBM	275	590
P118163W	8/6/1999	43	71	4	SESE	LANCE OIL & GAS COMPANY, INC	STUART 44-4	GST	CBM	272	559
P118164W	8/6/1999	43	71	5	SENW	LANCE OIL & GAS COMPANY, INC	STUART 22-5	GST	CBM	322	702

Table S4-4. Groundwater Rights for the West Jacobs Ranch LBA Tract (Continued).

Permit	Priority	T	R	S	QQ	Applicant	Facility Name	Status	Uses	Static WL	T.D.
P118165W	8/6/1999	43	71	5	SESW	LANCE OIL & GAS COMPANY, INC	STUART 24-5	GST	CBM	361	697
P118166W	8/6/1999	43	71	5	NWSE	LANCE OIL & GAS COMPANY, INC	STUART 33-5	GST	CBM	315	670
P118167W	8/6/1999	43	71	5	SENE	LANCE OIL & GAS COMPANY, INC	STUART 42-5	GST	CBM	303	628
P118168W	8/6/1999	43	71	5	SESE	LANCE OIL & GAS COMPANY, INC	STUART 44-5	GST	CBM	295	648
P121878W	12/29/1999	43	71	5	NWNW	LANCE OIL & GAS COMPANY, INC	STUART 11-5	GST	CBM	343	717
P121879W	12/29/1999	43	71	5	NWSW	LANCE OIL & GAS COMPANY, INC	STUART 13-5-4371	GST	CBM	337	688
P121880W	12/29/1999	43	71	5	NWNE	LANCE OIL & GAS COMPANY, INC	STUART 31-5-4371	GST	CBM	317	670
P121881W	12/29/1999	43	71	6	NWNW	LANCE OIL & GAS COMPANY, INC	HENDERSON 11-6-4371	GST	CBM	442	832
P121882W	12/29/1999	43	71	6	NWSW	LANCE OIL & GAS COMPANY, INC	HENDERSON 13-6	GST	CBM	375	860
P121883W	12/29/1999	43	71	6	SENW	LANCE OIL & GAS COMPANY, INC	HENDERSON 22-6-4371	GST	CBM	419	792
P121884W	12/29/1999	43	71	6	NWNE	LANCE OIL & GAS COMPANY, INC	STUART 31-6-4371	GST	CBM	369	742
P121885W	12/29/1999	43	71	6	NWSE	LANCE OIL & GAS COMPANY, INC	STUART 33-6-4371	GST	CBM	393	760
P121886W	12/29/1999	43	71	6	SENE	LANCE OIL & GAS COMPANY, INC	STUART 42-6-4371	GST	CBM	348	722
P121887W	12/29/1999	43	71	6	SESE	LANCE OIL & GAS COMPANY, INC	STUART 44-6-4371	GST	CBM	372	703
P128475W	8/17/2000	43	71	6	SESW	LANCE OIL & GAS COMPANY, INC	HENDERSON FEDERAL 24-6-4371	GST	CBM	750	807
P107621W	9/17/1997	43	71	7	SWSW	LANCE OIL & GAS COMPANY, INC	EDWARDS 14-7	GST	STO,CBM	263	665
P107622W	9/17/1997	43	71	7	NWSW	LANCE OIL & GAS COMPANY, INC	EDWARDS 13-7	GST	STO,CBM	275	707
P107624W	9/17/1997	43	71	7	NWNW	LANCE OIL & GAS COMPANY, INC	EDWARDS 11-7	GST	STO,CBM	550	628
P112055W	10/6/1998	43	71	7	NENW	LANCE OIL & GAS COMPANY, INC	LITTLE THUNDER EDWARDS 21-7	GST	CBM,MIS	200	606
P112056W	10/6/1998	43	71	7	NESW	LANCE OIL & GAS COMPANY, INC	LITTLE THUNDER EDWARDS 23-7	GST	CBM	268	698
P112057W	10/6/1998	43	71	7	SESW	LANCE OIL & GAS COMPANY, INC	LITTLE THUNDER EDWARDS 24-7	GST	CBM	254	688
P116056W	5/27/1999	43	71	7	SWSW	WILLIAMS PRODUCTION RMT, COMPANY	ENL EDWARDS 14-7	GST	CBM	263	665
P116057W	5/27/1999	43	71	7	NWSW	WILLIAMS PRODUCTION RMT, COMPANY	ENL EDWARDS 13-7	GST	CBM	275	707
P121888W	12/29/1999	43	71	7	SWNE	LANCE OIL & GAS COMPANY, INC	LEADBETTER 32-7-4371	GST	CBM	361	640
P121889W	12/29/1999	43	71	7	SWSE	LANCE OIL & GAS COMPANY, INC	LEADBETTER 34-7	GST	CBM	338	667
P121890W	12/29/1999	43	71	7	NENE	LANCE OIL & GAS COMPANY, INC	LEADBETTER 41-7-4371	GST	CBM	370	703
P121891W	12/29/1999	43	71	7	NESE	LANCE OIL & GAS COMPANY, INC	LEADBETTER 43-7-4371	GST	CBM	343	680
P12761P	12/30/1951	43	71	8	SWSW	USDA FOREST SERVICE	RENO #TB 41	PUW	STO	-1	152
P128481W	8/15/2000	43	71	8	NENE	LANCE OIL & GAS COMPANY, INC	FEDERAL 41-8-4371	GST	CBM	125	701
P165345W	1/31/2005	43	71	8	NESE	LANCE OIL & GAS COMPANY, INC	FEDERAL 43-8-4371	GSI	CBM		
P107568W	7/28/1997	43	71	9	NENE	LANCE OIL & GAS COMPANY, INC	STUART 1-41-9	GST	CBM,MIS	180	540
P110773W	6/22/1998	43	71	9	NESE	LANCE OIL & GAS COMPANY, INC	STUART FEDERAL 42-9	GST	CBM	408	542
P115199W	4/16/1999	43	71	9	NENE	BARRETT RESOURCES CORP	ENL STUART FED. 1-41-9	GST	CBM	180	540
P45855W	10/11/1978	43	71	10	SWNE	USDA FOREST SERVICE	MARG #13	PUW	STO	79	383
P118169W	8/6/1999	43	71	10	NESW	BARRETT RESOURCES CORP	STUART 23-10	UNA	CBM		
P166310W	3/18/2005	43	71	10	SWSE	LANCE OIL & GAS COMPANY, INC	STUART FED 34-10-4371	GSI	CBM		
P166746W	4/1/2005	43	71	10	SWNE	LANCE OIL & GAS COMPANY, INC	STUART FED 32-10-4371	GSI	CBM		
P166747W	4/1/2005	43	71	10	NESE	LANCE OIL & GAS COMPANY, INC	STUART FED 43-10-4371	GSI	CBM		
P12762P	12/30/1950	43	71	11	SENW	USDA FOREST SERVICE	STUART #TB 37	PUW	STO	-1	146
P121916W	12/30/2000	43	71	11	SWSE	LANCE OIL & GAS COMPANY, INC	ZIMMER 34-11	GST	CBM	362	442
P121917W	12/30/2000	43	71	11	NESE	LANCE OIL & GAS COMPANY, INC	ZIMMER 43-11	GST	CBM	350	410
P5866W	6/22/1970	43	71	12	SWNE	DALE MILLS**RENO LIVESTOCK CORPORATION	HEARTSPEAR 12	ADJ	STO	6	212
P120249W	11/1/1999	43	71	12	NWNW	RIM OPERATING, INC	CBM D #11-12	GSE	STO,CBM		
P120250W	11/1/1999	43	71	12	NWSW	RIM OPERATING, INC	CBM D #13-12	UNA	STO,CBM		
P120251W	11/1/1999	43	71	12	SENW	RIM OPERATING, INC	CBM D #22-12	GST	STO,CBM	179	375
P120252W	11/1/1999	43	71	12	SESW	RIM OPERATING, INC	CBM D #24-12	UNA	STO,CBM		
P120253W	11/1/1999	43	71	12	NWNE	RIM OPERATING, INC	CBM D #31-12	GST	STO,CBM	170	365
P120254W	11/1/1999	43	71	12	NWSE	RIM OPERATING, INC	CBM D #33-12	GST	STO,CBM	162	392
P120255W	11/1/1999	43	71	12	SENE	RIM OPERATING, INC	CBM D #42-12	GST	STO,CBM	170	365
P120256W	11/1/1999	43	71	12	SESE	RIM OPERATING, INC	CBM D #44-12	GST	STO,CBM	170	375



## Supplementary Information on the Affected Environment

Table S4-4. Groundwater Rights for the West Jacobs Ranch LBA Tract (Continued).											
Permit	Priority	T	R	S	QQ	Applicant	Name	Status	Uses	Static WL	T.D.
P135819W	6/15/2001	43	71	12	NWNE	RIM OPERATING, INC	ENL CBM D # 31-12	GST	STO,CBM	170	365
P143826W	4/2/2002	43	71	12	SENE	RIM OPERATING, INC	ENL. CBM D #42-12	GST	STO,CBM	170	365
P144375W	5/2/2002	43	71	12	NWSE	RIM OPERATING, INC.	ENL. CBM D #33-12	GST	STO,CBM	162	392
P5862P	8/31/1968	43	71	13	NESW	RENO LIVESTOCK CORPORATION	HEARTSPEAR 8	PUW	STO	90	324
P112580W	10/30/1998	43	71	13	NWNW	LANCE OIL & GAS COMPANY, INC	YOUNG 11-13	GST	CBM	301	410
P121919W	12/30/2000	43	71	13	SENW	LANCE OIL & GAS COMPANY, INC	ARCH 22-13	GST	CBM	347	410
P121920W	12/30/2000	43	71	13	SESW	LANCE OIL & GAS COMPANY, INC	ARCH 24-13	GST	CBM	340	415
P121989W	12/31/1999	43	71	13	NWSW	LANCE OIL & GAS COMPANY, INC	ARCH 13-13	GST	CBM	362	432
P123115W	2/7/2000	43	71	13	SESE	LANCE OIL & GAS COMPANY, INC	HOPKINS TRUST 44-13-4371	GST	CBM	183	384
P123116W	2/7/2000	43	71	13	NWSE	LANCE OIL & GAS COMPANY, INC	ARCH 33-13-4371	GST	CBM	140	450
P132545W	2/8/2001	43	71	13	NENE	RIM OPERATING, INC	CBM D # 41-13	GST	MON	221	385
P19253P	12/31/1950	43	71	14	SENW	ARK LAND COMPANY	REVLAND #3	UNA	STO	-1	80
P121921W	12/30/2000	43	71	14	SENE	LANCE OIL & GAS COMPANY, INC	ARCH 42-14	GST	CBM	361	462
P121922W	12/30/2000	43	71	14	SESE	LANCE OIL & GAS COMPANY, INC	ARCH 44-14	GST	CBM	410	467
P123113W	2/7/2000	43	71	14	SWSW	WILLIAMS PRODUCTION RMT, COMPANY	REVLAND TRUST 14-14-4371	GSI	CBM		
P141592W	12/17/2001	43	71	14	SWSW	LANCE OIL & GAS COMPANY, INC	REVLAND TRUST 14-14-4371	GSI	CBM		
P166322W	3/18/2005	43	71	14	SWSE	LANCE OIL & GAS COMPANY, INC	FEDERAL 34-14-4371	GSI	CBM		
P166323W	3/18/2005	43	71	14	SWNE	LANCE OIL & GAS COMPANY, INC	FEDERAL 32-14-4371	GSI	CBM		
P139458W	9/24/2001	43	71	15	SWNW	COLEMAN OIL & GAS, INC.** THUNDER BASIN COAL COMPANY LLC	THUNDER BASIN #15-12	GST	STO,CBM	473	562
P139459W	9/24/2001	43	71	15	NENW	COLEMAN OIL & GAS, INC.** THUNDER BASIN COAL COMPANY LLC	THUNDER BASIN #15-21	GST	STO,CBM	452	519
P139460W	9/24/2001	43	71	15	SWSW	COLEMAN OIL & GAS, INC.** THUNDER BASIN COAL COMPANY LLC	THUNDER BASIN #15-14	GST	STO,CBM	450	543
P139461W	9/24/2001	43	71	15	NESW	COLEMAN OIL & GAS, INC.** THUNDER BASIN COAL COMPANY LLC	THUNDER BASIN #15-23	GST	STO,CBM	464	543
P145780W	6/26/2002	43	71	15	NESE	THUNDER BASIN COAL COMPANY** COLEMAN OIL & GAS, INC.	THUNDER BASIN #15-43	GST	STO,CBM	454	503
P145788W	6/26/2002	43	71	15	SWSE	THUNDER BASIN COAL COMPANY** COLEMAN OIL & GAS, INC.	THUNDER BASIN #15-34	GST	STO,CBM	448	542
P145789W	6/26/2002	43	71	15	NENE	THUNDER BASIN COAL COMPANY** COLEMAN OIL & GAS, INC.	THUNDER BASIN #15-41	GST	STO,CBM	470	521
P33997W	7/6/1976	43	71	16	SESE	WY BOARD OF LAND COMMISSIONERS** THUNDER BASIN COAL COMPANY	WCH 3	PUW	MON		
P123106W	2/7/2000	43	71	16	SWSE	WY STATE BOARD OF LAND COMMISSIONERS** LANCE OIL & GAS COMPANY, INC	STATE 34-16-4371	GST	CBM	349	623
P123107W	2/7/2000	43	71	16	NESW	WY STATE BOARD OF LAND COMMISSIONERS** LANCE OIL & GAS COMPANY, INC	STATE 23-16-4371	GST	CBM	353	610
P123108W	2/7/2000	43	71	16	NENW	WY STATE BOARD OF LAND COMMISSIONERS** LANCE OIL & GAS COMPANY, INC	STATE 21-16-4371	GST	CBM	482	602
P123109W	2/7/2000	43	71	16	SWSW	WY STATE BOARD OF LAND COMMISSIONERS** LANCE OIL & GAS COMPANY, INC	STATE 14-16-4371	GST	CBM	399	620
P123110W	2/7/2000	43	71	16	SWNW	WY STATE BOARD OF LAND COMMISSIONERS** LANCE OIL & GAS COMPANY, INC	STATE 12-16-4371	GST	CBM	425	622
P128141W	8/8/2000	43	71	16	NENE	WY STATE BOARD OF LAND COMMISSIONERS** COLEMAN OIL & GAS, INC.	EDWARDS STATE 16-1	GST	CBM	61	542
P128142W	8/8/2000	43	71	16	SWNE	WY STATE BOARD OF LAND COMMISSIONERS** COLEMAN OIL & GAS, INC.	EDWARDS STATE #16-2	GST	CBM	59	556
P129244W	9/5/2000	43	71	16	NESE	WY STATE BOARD OF LAND COMMISSIONERS** COLEMAN OIL & GAS, INC.	EDWARDS STATE #3-16	GST	STO,CBM	63	526
P123018W	1/19/2000	43	71	17	NENW	LANCE OIL & GAS COMPANY, INC	ARKLAND 21-17-4371	GST	CBM	554	630
P123019W	1/19/2000	43	71	17	NESW	LANCE OIL & GAS COMPANY, INC	ARKLAND 23-17-4371	GST	CBM	464	650

Table S4-4. Groundwater Rights for the West Jacobs Ranch LBA Tract (Continued).

Permit	Priority	T	R	S	QQ	Applicant	Facility Name	Status	Uses	Static WL	T.D.
P123020W	1/19/2000	43	71	17	SWSE	LANCE OIL & GAS COMPANY, INC	ARKLAND 34-17-4371	GST	CBM	367	631
P123021W	1/19/2000	43	71	17	NESE	LANCE OIL & GAS COMPANY, INC	ARKLAND 43-17-4371	GST	CBM	378	610
P137865W	7/23/2001	43	71	17	SWNW	LANCE OIL & GAS COMPANY, INC	THUNDER BASIN COAL FEDERAL 12-17-4371	GST	CBM	59	643
P137866W	7/23/2001	43	71	17	SWSW	LANCE OIL & GAS COMPANY, INC	THUNDER BASIN COAL FEDERAL 14-17-4371	GST	CBM	190	641
P137867W	7/23/2001	43	71	17	SWNE	LANCE OIL & GAS COMPANY, INC	FEDERAL 32-17-4371	GST	CBM	10	590
P137868W	7/23/2001	43	71	17	NENE	LANCE OIL & GAS COMPANY, INC	FEDERAL 41-17-4371	GST	CBM	190	641
P143845W	4/9/2002	43	71	18	SWSE	LANCE OIL & GAS COMPANY, INC	FEDERAL 34-18-4371	GSI	CBM		
P143846W	4/9/2002	43	71	18	NESE	LANCE OIL & GAS COMPANY, INC	FEDERAL 43-18-4371	GSE	CBM		
P143858W	4/9/2002	43	71	18	SWSW	LANCE OIL & GAS COMPANY, INC	FEDERAL 14-18-4371	GSE	CBM		
P143859W	4/9/2002	43	71	18	NESW	LANCE OIL & GAS COMPANY, INC	FEDERAL 23-18-4371	GSE	CBM		
P148119W	10/29/2002	43	71	18	NENE	WESTPORT OIL & GAS COMPANY, L.P.	FEDERAL 41-18-4371	GST	CBM	572.6	637
P148120W	10/29/2002	43	71	18	SWNE	WESTPORT OIL & GAS COMPANY, L.P.	FEDERAL 32-18-4371	GST	CBM	612.4	650
P152897W	7/25/2003	43	71	18	SWNW	WILLIAMS PRODUCTION RMT COMPANY	EDWARDS FEDERAL 12-18-4371	GST	STO,CBM	641	723
P151684W	5/30/2003	43	71	19	NESE	WESTPORT OIL & GAS COMPANY INC	FEDERAL 43-19	GSE	CBM		
P151685W	5/30/2003	43	71	19	SWSE	WESTPORT OIL & GAS COMPANY INC	FEDERAL 34-19	GSE	CBM		
P151686W	5/30/2003	43	71	19	SWNE	WESTPORT OIL & GAS COMPANY INC	FEDERAL 32-19	GSE	CBM		
P151687W	5/30/2003	43	71	19	NESW	WESTPORT OIL & GAS COMPANY INC	FEDERAL 23-19-4371	GSE	CBM		
P151688W	5/30/2003	43	71	19	NENW	WESTPORT OIL & GAS COMPANY INC	FEDERAL 21-19-4371	GSE	CBM		
P151689W	5/30/2003	43	71	19	SWSW	WESTPORT OIL & GAS COMPANY INC	FEDERAL 14-19-4371	GSE	CBM		
P151690W	5/30/2003	43	71	19	SWNW	WESTPORT OIL & GAS COMPANY INC	FEDERAL 12-19-4371	GSE	CBM		
P153633W	8/12/2003	43	71	19	NENE	WILLIAMS PRODUCTION RMT COMPANY	ARCH STATE 41-19- 4371	GST	STO,CBM	594	657
P143847W	4/9/2002	43	71	20	SWSW	LANCE OIL & GAS COMPANY, INC	FEDERAL 14-20-4371	GSE	CBM		
P143849W	4/9/2002	43	71	20	SWNW	WILLIAMS PRODUCTION RMT COMPANY	FEDERAL 12-20-4371	GSI	CBM		
P143850W	4/9/2002	43	71	20	NENW	LANCE OIL & GAS COMPANY, INC	FEDERAL 21-20-4371	GSE	CBM		
P143851W	4/9/2002	43	71	20	SWNE	LANCE OIL & GAS COMPANY, INC	FEDERAL 32-20-4371	GSE	CBM		
P143852W	4/9/2002	43	71	20	SWSE	LANCE OIL & GAS COMPANY, INC	FEDERAL 34-20-4371	GSE	CBM		
P143853W	4/9/2002	43	71	20	NENE	LANCE OIL & GAS COMPANY, INC	FEDERAL 41-20-4371	GSE	CBM		
P143854W	4/9/2002	43	71	20	NESE	LANCE OIL & GAS COMPANY, INC	FEDERAL 43-20-4371	GSE	CBM		
P154193W	9/9/2003	43	71	20	NWNW	WILLIAMS PRODUCTION RMT COMPANY	ARCH STATE 11-20- 4371	GST	STO,CBM	567	664
P32088W	1/16/1976	43	71	21	SENE	UNIVERSITY OF WYOMING WRRI	LTB 2A	PUW	MON	37	100
P32089W	1/16/1976	43	71	21	SENE	UNIVERSITY OF WYOMING WRRI	LTB 2B	PUW	MON	36	200
P32090W	1/16/1976	43	71	21	SENE	UNIVERSITY OF WYOMING WRRI	LTB 2C	PUW	MON	191	574
P84348W	2/5/1991	43	71	21	SENE	USDA FOREST SERVICE	EDWARDS #T.B. 266	UNA	STO	191	574
P143855W	4/9/2002	43	71	21	SWNW	LANCE OIL & GAS COMPANY, INC	FEDERAL 12-21	GSE	CBM		
P143856W	4/9/2002	43	71	21	SWSW	LANCE OIL & GAS COMPANY, INC	FEDERAL 14-21	GSE	CBM		
P143857W	4/9/2002	43	71	21	NENW	LANCE OIL & GAS COMPANY, INC	FEDERAL 21-21	GSE	CBM		
P167145W	4/13/2005	43	71	21	NESW	LANCE OIL & GAS COMPANY, INC	FEDERAL 23-21-4371	GSI	CBM		
P169600W	8/19/2005	43	71	21	SWNE	LANCE OIL & GAS COMPANY, INC.	FEDERAL 32-21-4371	GSI	CBM		
P169867W	8/15/2005	43	71	21	NENE	LANCE OIL & GAS COMPANY, INC.	FEDERAL 41-21-4371	GSI	CBM		
P176288W	7/12/2006	43	71	21	SESW	THOMAS W. & LEAH B. EDWARDS	EDWARDS #8	GSI	STO		
P8912W	5/4/1971	43	71	22	NWNW	USDA FOREST SERVICE	RENO #T B 152	PUW	STO	-1	-1
P8913W	5/24/1971	43	71	22	SWNW	USDA FOREST SERVICE	RENO #T B 153	PUW	STO	-1	-1
P121923W	12/30/2000	43	71	22	SWNE	LANCE OIL & GAS COMPANY, INC	ARCH 32-22	GST	CBM	241	541
P121924W	12/30/2000	43	71	22	SWSE	LANCE OIL & GAS COMPANY, INC	ARCH 34-22	GST	CBM	230	540
P121925W	12/30/2000	43	71	22	NENE	LANCE OIL & GAS COMPANY, INC	ARCH 41-22	GST	CBM	236	531
P121926W	12/30/2000	43	71	22	NESE	LANCE OIL & GAS COMPANY, INC	ARCH 43-22	GST	CBM	244	514
P152852W	7/24/2003	43	71	22	SWSW	WILLIAMS PRODUCTION RMT COMPANY	FEDERAL 14-22-4371R	GSE	CBM		
P167141W	4/13/2005	43	71	22	SWSW	LANCE OIL & GAS COMPANY, INC	FEDERAL 14-22-4371R	GSI	CBM		
P44326W	7/20/1978	43	71	23	SWSW	USDA FOREST SERVICE	MARG #1	PUW	STO	230	375

## Supplementary Information on the Affected Environment

Table S4-4. Groundwater Rights for the West Jacobs Ranch LBA Tract (Continued).											
Permit	Priority	T	R	S	QQ	Applicant	Facility Name	Status	Uses	Static WL	T.D.
P128505W	8/17/2000	43	71	23	SWSE	USDA, NATIONAL FOREST SERVICE** LANCE OIL & GAS COMPANY, INC	BRC FEDERAL 34-23	GST	CBM	360	475
P152855W	7/24/2003	43	71	23	NENW	WILLIAMS PRODUCTION RMT COMPANY	FEDERAL 21-23-4371	GSE	CBM		
P167138W	4/13/2005	43	71	23	SWNW	LANCE OIL & GAS COMPANY, INC	FEDERAL 12-23-4371	GSI	CBM		
P167144W	4/13/2005	43	71	23	NENW	LANCE OIL & GAS COMPANY, INC	FEDERAL 21-23-4371	GSI	CBM		
P167146W	4/13/2005	43	71	23	NESW	LANCE OIL & GAS COMPANY, INC	FEDERAL 23-23-4371	GSI	CBM		
P169601W	8/19/2005	43	71	23	SWNE	LANCE OIL & GAS COMPANY, INC.	FEDERAL 32-23-4371	GSI	CBM		
P169864W	8/15/2005	43	71	23	NESE	LANCE OIL & GAS COMPANY, INC.	FEDERAL 43-23-4371	GSI	CBM		
P169868W	8/15/2005	43	71	23	NENE	LANCE OIL & GAS COMPANY, INC.	FEDERAL 41-23-4371	GSI	CBM		
P121927W	12/30/2000	43	71	24	SENW	LANCE OIL & GAS COMPANY, INC	ARCH 22-24	GST	CBM	352	427
P121928W	12/30/2000	43	71	24	NWNE	LANCE OIL & GAS COMPANY, INC	ARCH 31-24	GST	CBM	267	470
P128509W	8/17/2000	43	71	24	SWSW	USDA, NATIONAL FOREST SERVICE** WILLIAMS PRODUCTION RMT, COMPANY	BRC FEDERAL 14-24	GST	CBM	321	421
P147621W	10/4/2002	43	71	24	NENE	LANCE OIL & GAS COMPANY, INC	ARCH 41-24-4371	GSE	CBM		
P166461W	3/31/2005	43	71	24	NESW	LANCE OIL & GAS COMPANY, INC	FEDERAL 23-24-4371	GSI	CBM		
P167139W	4/13/2005	43	71	24	SWNW	LANCE OIL & GAS COMPANY, INC	FEDERAL 12-24-4371WY	GSI	CBM		
39/8/477W	1/2/2007	43	72	1	NESE	PAUL R/RUBY H STUART	NORTHEAST PASTURE #2	UNA	STO		
P101221W	1/8/1996	43	72	1	NESE	PAUL R/RUBY H STUART	NORTHEAST PASTURE #1	UNA	STO	102	120
P112058W	10/6/1998	43	72	1	NWSE	LANCE OIL & GAS COMPANY, INC	LITTLE THUNDER STUART 33-1	GST	CBM	330.4	791
P112059W	10/6/1998	43	72	1	SWSE	LANCE OIL & GAS COMPANY, INC	LITTLE THUNDER STUART 34-1	GST	CBM	324	770
P112060W	10/6/1998	43	72	1	NESE	LANCE OIL & GAS COMPANY, INC	LITTLE THUNDER STUART 43-1	GST	CBM	350	835
P112061W	10/6/1998	43	72	1	SESE	BARRETT RESOURCES CORP.	LITTLE THUNDER STUART 44-1	GST	CBM	318	765
P116058W	5/27/1999	43	72	1	NESE	WILLIAMS PRODUCTION RMT, COMPANY	ENL STUART 43-1	GST	CBM	350	835
P121892W	12/29/1999	43	72	1	NWSE	LANCE OIL & GAS COMPANY, INC	STUART 13-1-4372	GST	CBM	512	842
P121893W	12/29/1999	43	72	1	SESW	LANCE OIL & GAS COMPANY, INC	STUART 24-1	GST	CBM	540	882
P128527W	8/17/2000	43	72	1	SWNW	LANCE OIL & GAS COMPANY, INC	STUART FEDERAL 12-1-4372	GST	CBM	48.5	855
P128528W	8/17/2000	43	72	1	NENW	LANCE OIL & GAS COMPANY, INC	STUART FEDERAL 21-1-4372	GST	CBM	167	993
P128529W	8/17/2000	43	72	1	SWNE	LANCE OIL & GAS COMPANY, INC	STUART FEDERAL 32-1-4372	GST	CBM	46.2	890
P128531W	8/17/2000	43	72	1	NENE	LANCE OIL & GAS COMPANY, INC	STUART FEDERAL 41-1-4372	GST	CBM	93	931
P2292W	12/31/1951	43	72	2	SWNW	COSNER RANCH INC.	COSNER #16	PUW	STO	60	75
P41506W	1/18/1978	43	72	2	SESW	WYOMING STATE HIGHWAY DEPARTMENT**INC. STEWART BROTHERS	STEWART BROTHERS #5	PUW	MIS	69	258
P54276W	10/7/1980	43	72	2	SESW	WYOMING STATE HIGHWAY DEPARTMENT	STEWART BROTHERS #5	PUW	MIS	69	258
P65160W	2/10/1982	43	72	2	SESW	PAUL AND RUBY H. STUART	STUART BROTHERS #5	UNA	STO	69	258
P66349W	11/7/1983	43	72	2	NENW	ROBERT H. & DOROTHY A. GRAY	LAUGHING WATERS #1	PUW	MIS		
P100735W	10/23/1995	43	72	2	SWSW	PAUL R/RUBY H STUART	PAUL #3	UNA	DOM,STO	105	235
P130855W	11/14/2000	43	72	2	NESE	LANCE OIL & GAS COMPANY, INC	STUART 43-2-4372	GST	CBM	749	823
P130856W	11/14/2000	43	72	2	SWNE	LANCE OIL & GAS COMPANY, INC	STUART 32-2-4372	GST	CBM	715	830
P130857W	11/14/2000	43	72	2	SWSE	LANCE OIL & GAS COMPANY, INC	STUART 34-2-4372	GST	CBM	654	800
P130858W	11/14/2000	43	72	2	NENE	LANCE OIL & GAS COMPANY, INC	STUART 41-2-4372	GST	CBM	834	881
40/3/264W	7/16/2007	43	72	3	SWNE	WRIGHT WATER & SEWER DISTRICT	RJ-7	UNA	MUN,MIS		
P2291W	12/31/1951	43	72	3	NWSE	COSNER RANCH INC.	COSNER #15	PUW	STO	90	125
P102005W	4/9/1996	43	72	3	NESE	TIMOTHY J/MARIS L MEISTER	MEISTER #1	UNA	DOM,STO	120	280
P106939W	8/5/1997	43	72	3	SWSE	RODNEY NEAL HICKS	HICKS #1	UNA	DOM,STO	120	240

Table S4-4. Groundwater Rights for the West Jacobs Ranch LBA Tract (Continued).

Permit	Priority	T	R	S	QQ	Applicant	Facility Name	Status	Uses	Static WL	T.D.
P111488W	8/11/1998	43	72	3	SESW	WALTER F/CYNTHIA SIEBERT	SIEBERT #1	UNA	DOM	120	280
P117269W	7/28/1999	43	72	3	SESW	ALVIN/CINDY MILLER	MILLER NO.1		DOM	150	400
P146810W	8/19/2002	43	72	3	NWNW	DEAN COSNER** DEVON ENERGY PRODUCTION COMPANY, L.P.	D COSNER FEDERAL 3W-4	GST	STO,CBM	719	958
P146811W	8/19/2002	43	72	3	SENW	DEAN COSNER** DEVON ENERGY PRODUCTION COMPANY, L.P.	D COSNER FEDERAL 3W-6	GST	STO,CBM	781	986
P146812W	8/19/2002	43	72	3	NWSW	DEAN COSNER** DEVON ENERGY PRODUCTION COMPANY, L.P.	D COSNER FEDERAL 3W-12	GST	STO,CBM	810	986
P164796W	12/27/2004	43	72	3	NESW	DEVON ENERGY PRODUCTION COMPANY, L.P.	MEISTER FEDERAL 3W-11	GST	CBM	866	929
P101766W	3/18/1996	43	72	10	NESE	MICHAEL/SAMMIE ISBELL	ISBELL #1	UNA	DOM,STO	230	470
P102916W	7/5/1996	43	72	10	SENW	SHAWN L/DEBORAH L KORNEGAY	KORNEGAY #1	UNA	DOM	150	365
P104026W	9/20/1996	43	72	10	SWNE	PAUL A AUZQUI	SAM #1	UNA	DOM,STO	120	260
P104782W	1/6/1997	43	72	10	NENE	TED COSNER	HLADKY #1	UNA	DOM,STO	140	240
P139583W	10/11/2001	43	72	10	SWSE	GARRY W. / KAREN S. STARKS	STARKS # 1	GST	DOM,STO	84	260
P146826W	8/19/2002	43	72	10	NWNW	DEAN COSNER** DEVON ENERGY PRODUCTION COMPANY, L.P.	D COSNER FEDERAL 10W-4	GST	STO,CBM	150	950
P146827W	8/19/2002	43	72	10	NWSW	DEAN COSNER** DEVON ENERGY PRODUCTION COMPANY, L.P.	DCOSNER FEDERAL10W-12	GST	STO,CBM	801	1033
P164790W	12/27/2004	43	72	10	SWSE	DEVON ENERGY PRODUCTION COMPANY, L.P.**TED COSNER	T COSNER FEDERAL 10W-15	GST	CBM	846	906
P164791W	12/27/2004	43	72	10	NESW	DEVON ENERGY PRODUCTION COMPANY, L.P.**TED COSNER	T COSNER FEDERAL 10W-11	GST	CBM	869	927
P164792W	12/27/2004	43	72	10	NESE	DEVON ENERGY PRODUCTION COMPANY, L.P.	MULLINS FEDERAL 10W-9	GST	CBM	771	832
P164793W	12/27/2004	43	72	10	SWNE	DEVON ENERGY PRODUCTION COMPANY, L.P.	MACKEY FEDERAL 10W-7	GST	CBM	871	893
P164794W	12/27/2004	43	72	10	NENW	DEVON ENERGY PRODUCTION COMPANY, L.P.**TED COSNER	T COSNER FEDERAL 10W-3	GST	CBM	859	915
P164795W	12/27/2004	43	72	10	NENE	DEVON ENERGY PRODUCTION COMPANY, L.P.	HLADKY FEDERAL 10W-1	GST	CBM	806	860
P2296W	8/5/1951	43	72	11	NWSW	COSNER RANCH INC.	COSNER #17 (DEEPENED)	PUW	STO	20	212
P5328W	4/22/1970	43	72	11	SWSW	COSNER RANCH INC.	COSNER #21	PUW	STO	15	208
P13081P	7/31/1959	43	72	11	SENW	WYOMING STATE HIGHWAY DEPARTMENT	RENO CAMP #1	ADJ	DOM	-1	513
P18211P	8/31/1959	43	72	11	NESW	DOUGLAS D WILLIAMS	COSNER #23	UNA	DOM	270	490
P29600W	3/10/1975	43	72	11	NWSW	COSNER RANCH INC.	ENL COSNER #17	PUW	TEM,IND,DRI	20	212
P31660W	12/2/1975	43	72	11	NWSW	COSNER RANCH INC.	ENL COSNER #17	PUW	STO	20	212
P32087W	1/16/1976	43	72	11	SENW	UNIVERSITY OF WYOMING WRRI	LTB 1	PUW	MON	74	300
P41502W	1/18/1978	43	72	11	NWNE	WYOMING STATE HIGHWAY DEPARTMENT**INC. STEWART BROTHERS	STEWART BROTHERS #1	PUW	IND	69.5	235
P41503W	1/18/1978	43	72	11	SWNE	WYOMING STATE HIGHWAY DEPARTMENT**INC. STEWART BROTHERS	STEWART BROTHERS #2	PUW	IND		
P41507W	1/18/1978	43	72	11	SENE	WYOMING STATE HIGHWAY DEPARTMENT**INC. STEWART BROTHERS	STEWART BROTHERS #6	PUW	MIS		
P52701W	3/31/1980	43	72	11	SENW	WYOMING STATE HIGHWAY DEPARTMENT	RENO WHD #2	PUW	MIS	80	240
P54275W	10/7/1980	43	72	11	NWNE	WYOMING STATE HIGHWAY DEPARTMENT	STEWART BROTHERS #1	PUW	MIS	69.5	235
P59329W	6/16/1981	43	72	11	SENW	WYOMING STATE HIGHWAY DEPARTMENT	ENL RENO CAMP #1	PUW	MIS	-1	513
P65159W	2/10/1983	43	72	11	NWNE	PAUL AND RUBY H. STUART	STUART BROTHERS #1	UNA	STO	69.5	235
P80780W	9/5/1989	43	72	11	SWSW	TED R. COSNER	#S1 COSNER	UNA	STO	2	8
P94949W	4/12/1994	43	72	11	SENW	WYOMING DEPT. OF TRANSPORTATION	3093RJ-1	UNA	MON	15.33	25
P94950W	4/12/1994	43	72	11	SENW	WYOMING DEPT. OF TRANSPORTATION	3093RJ-2	UNA	MON	24.89	33
P94951W	4/12/1994	43	72	11	SENW	WYOMING DEPT. OF TRANSPORTATION	3093RJ-3	UNA	MON	14.02	28

## Supplementary Information on the Affected Environment

Table S4-4. Groundwater Rights for the West Jacobs Ranch LBA Tract (Continued).											
Permit	Priority	T	R	S	QQ	Applicant	Facility Name	Status	Uses	Static WL	T.D.
P94952W	4/12/1994	43	72	11	SENW	WYOMING DEPT. OF TRANSPORTATION	3093RJ-4	UNA	MON	14.67	28
P121894W	12/29/1999	43	72	11	SWNW	WILLIAMS PRODUCTION RMT, COMPANY	STUART 12-11-4372	GSI	CBM		
P121895W	12/29/1999	43	72	11	NENW	LANCE OIL & GAS COMPANY, INC	STUART 21-11-4372	GSI	CBM		
P121896W	12/29/1999	43	72	11	NESW	BARRETT RESOURCES CORP	STUART 23-11-4372	UNA	CBM		
P121897W	12/29/1999	43	72	11	SWNE	WILLIAMS PRODUCTION RMT, COMPANY	STUART 32-11-4372	GST	CBM	371	602
P121898W	12/29/1999	43	72	11	SWSE	LANCE OIL & GAS COMPANY, INC	STUART 34-11	GSI	CBM		
P121899W	12/29/1999	43	72	11	NESE	LANCE OIL & GAS COMPANY, INC	STUART 43-11-4372	GST	CBM	362	720
P129035W	9/20/2000	43	72	11	NENE	WY STATE ENGINEER'S OFFICE	CBM-MON-7W	UNA	MON	296	491
P147614W	10/4/2002	43	72	11	SWNW	LANCE OIL & GAS COMPANY, INC	STUART 12-11-4372	GST	CBM	704	824
P147615W	10/4/2002	43	72	11	NESW	LANCE OIL & GAS COMPANY, INC	STUART 23-11-4372	GST	CBM	636	838
P147616W	10/4/2002	43	72	11	NENW	LANCE OIL & GAS COMPANY, INC	STUART 21-11-4372	GST	CBM	680	834
P17996P	12/31/1935	43	72	12	SWSE	BILLY D. EDWARDS	HAY FIELD #1	PUW	STO	25	340
P41504W	1/18/1978	43	72	12	NWNW	WYOMING STATE HIGHWAY DEPARTMENT**INC. STEWART BROTHERS	STEWART BROTHERS #3	PUW	IND		
P101222W	1/8/1996	43	72	12	NWNW	PAUL R/RUBY H STUART	HOUSE #1	UNA	DOM	52	95
P107613W	9/17/1997	43	72	12	SESE	LANCE OIL & GAS COMPANY, INC	EDWARDS 44-12	GST	STO,CBM	258	727
P107614W	9/17/1997	43	72	12	NESE	LANCE OIL & GAS COMPANY, INC	EDWARDS 43-12	GST	STO,CBM	272	675
P107615W	9/17/1997	43	72	12	NENE	BARRETT RESOURCES CORP.	EDWARDS 4-12-8	UNA	STO,CBM		
P107617W	9/17/1997	43	72	12	SWSE	LANCE OIL & GAS COMPANY, INC	EDWARDS 34-12	GST	STO,CBM	257	716
P107618W	9/17/1997	43	72	12	NWSE	LANCE OIL & GAS COMPANY, INC	EDWARDS 33-12	GST	STO,CBM	263	671
P112062W	10/6/1998	43	72	12	SWSW	LANCE OIL & GAS COMPANY, INC	LITTLE THUNDER STUART 44-12	GST	CBM	265	733
P112063W	10/6/1998	43	72	12	NESW	LANCE OIL & GAS COMPANY, INC	LITTLE THUNDER STUART 23-12	GST	CBM	263	587
P112064W	10/6/1998	43	72	12	SESW	LANCE OIL & GAS COMPANY, INC	LITTLE THUNDER STUART 24-12	GST	CBM	265	690
P116053W	5/27/1999	43	72	12	NESE	WILLIAMS PRODUCTION RMT, COMPANY	ENL EDWARDS 43-12	GST	CBM	272	675
P116054W	5/27/1999	43	72	12	SWSE	WILLIAMS PRODUCTION RMT, COMPANY	ENL EDWARDS 34-12	GST	CBM	257	716
P116055W	5/27/1999	43	72	12	NWSE	WILLIAMS PRODUCTION RMT, COMPANY	ENL EDWARDS 33-12	GST	CBM	263	671
P116059W	5/27/1999	43	72	12	NESW	WILLIAMS PRODUCTION RMT, COMPANY	ENL STUART 23-12	GST	CBM	263	587
P116843W	6/24/1999	43	72	12	SESE	WILLIAMS PRODUCTION RMT, COMPANY	ENL EDWARDS 44-12	GST	CBM	258	727
P121900W	12/29/1999	43	72	12	SWNW	LANCE OIL & GAS COMPANY, INC	STUART 12-12-4372	GST	CBM	412	607
P121901W	12/29/1999	43	72	12	NENW	LANCE OIL & GAS COMPANY, INC	STUART 21-12-4372	GST	CBM	377	642
P48347W	6/4/1979	43	72	13	NWSE	HARRY UNDERWOOD	LL&E CO. # 1 STOCK	PUW	STO		
P48350W	6/5/1979	43	72	13	NWSE	THE LOUISIANA LAND & EXPLORATION COMPANY	LL&E CO. #1	PUW	MIS		
P106627W	6/10/1997	43	72	13	NWNW	LANCE OIL & GAS COMPANY, INC	EDWARDS FEDERAL #1-13	GST	STO,CBM	268	642
P141174W	11/27/2001	43	72	13	NENE	LANCE OIL & GAS COMPANY, INC	EDWARDS FEDERAL 41-13-4372	GST	CBM	496	603
P145688W	5/21/2002	43	72	13	NESW	PRIMA OIL AND GAS COMPANY	USFS4372-13-31	GST	STO,CBM,RES	652	759
P145689W	5/21/2002	43	72	13	SWSW	PRIMA OIL AND GAS COMPANY	PORCUPINE TUIT FED 13-33UW	GST	STO,CBM,RES	647	771
P152894W	7/25/2003	43	72	13	SWSE	LANCE OIL & GAS COMPANY, INC	EDWARDS 34-13-4372	GST	CBM	597	710
P158173W	4/1/2004	43	72	13	NESE	LANCE OIL & GAS COMPANY, INC.	EDWARDS 43-13-4372	GSI	CBM		
P173883W	3/24/2006	43	72	13	SWNE	LANCE OIL & GAS COMPANY, INC.	EDWARDS FED 32-13- 4372	GST	CBM	407	571
P147608W	10/4/2002	43	72	14	NENE	LANCE OIL & GAS COMPANY, INC	CARLSON 41-14-4372	GST	CBM	642	798
P149731W	2/19/2003	43	72	14	SWNE	LANCE OIL & GAS COMPANY, INC	CARLSON 32-14-4372	GST	CBM	675	792
P151692W	5/30/2003	43	72	14	NESE	WESTPORT OIL & GAS COMPANY INC	FEDERAL 43-14	GSE	CBM		
P151693W	5/30/2003	43	72	14	SWSE	WESTPORT OIL & GAS COMPANY INC	FEDERAL 34-14	GSE	CBM		
P158965W	5/17/2004	43	72	14	NESW	DEVON ENERGY PRODUCTION COMPANY, L.P.**DEAN COSNER	D COSNER FEDERAL 14W-11	GST	STO,CBM	735	787

Table S4-4. Groundwater Rights for the West Jacobs Ranch LBA Tract (Continued).

Permit	Priority	T	R	S	QQ	Applicant	Facility Name	Status	Uses	Static WL	T.D.
P158966W	5/17/2004	43	72	14	SWSW	DEVON ENERGY PRODUCTION COMPANY, L.P.**DEAN COSNER	D COSNER FEDERAL 14W-13	GST	STO,CBM	770	821
P2297W	7/31/1966	43	72	15	SWNE	COSNER RANCH INC.	COSNER #19	PUW	STO	61	111
P147565W	10/3/2002	43	72	15	NENE	WESTPORT OIL & GAS COMPANY, L.P.	COSNER FEDERAL 41-15	GST	CBM	676.2	840
P147566W	10/3/2002	43	72	15	SWSE	WESTPORT OIL & GAS COMPANY, L.P.	COSNER FEDERAL 34-15	GST	CBM	773.6	868
P147567W	10/3/2002	43	72	15	NENW	WESTPORT OIL & GAS COMPANY, L.P.	COSNER FEDERAL 21-15	GST	CBM	778.7	895
P147568W	10/3/2002	43	72	15	SWSW	WESTPORT OIL & GAS COMPANY, L.P.	COSNER FEDERAL 14-15	GST	CBM	656.2	962
P170648W	11/10/2005	43	72	15	NWNE	GLEN BELT	DOMESTIC WELL #1	GSI	DOM,STO		
P2956P	5/22/1969	43	72	23	SENE	INC. COSNER RANCH	COSNER #20	PUW	STO	240	360
P145690W	5/21/2002	43	72	23	NENE	PRIMA OIL AND GAS COMPANY	USFS 4372-23-11UW	GST	STO,CBM,RES	681	758
P145691W	5/21/2002	43	72	23	NESE	PRIMA OIL AND GAS COMPANY	USFS 4372-23-41UW	GST	STO,CBM,RES	679	766
P159553W	5/21/2004	43	72	23	NENW	DEVON ENERGY PRODUCTION COMPANY, L.P.	D COSNER FEDERAL 23W-3	GST	STO,CBM	764	795
P159554W	5/21/2004	43	72	23	SWNW	DEVON ENERGY PRODUCTION COMPANY, L.P.	D COSNER FEDERAL 23W-5	GST	STO,CBM	803	865
P159555W	5/21/2004	43	72	23	SWNE	DEVON ENERGY PRODUCTION COMPANY, L.P.	D COSNER FEDERAL 23W-7	GST	STO,CBM	760	809
P159556W	5/21/2004	43	72	23	NESW	DEVON ENERGY PRODUCTION COMPANY, L.P.	D COSNER FEDERAL 23W-11	GST	STO,CBM	820	855
P159557W	5/21/2004	43	72	23	SWSW	DEVON ENERGY PRODUCTION COMPANY, L.P.	D COSNER FEDERAL 23W-13	GST	STO,CBM	897	919
P159558W	5/21/2004	43	72	23	SWSE	DEVON ENERGY PRODUCTION COMPANY, L.P.	D COSNER FEDERAL 23W-15	GST	STO,CBM	796	827
P12765P	2/12/1937	43	72	24	SESW	USDA FOREST SERVICE	EDWARDS #TB 27	UNA	STO	-1	-1
P82834W	7/2/1990	43	72	24	SENE	USA USDA FOREST SERVICE	EDWARDS #TB 265	UNA	STO	50	99
P145692W	5/21/2002	43	72	24	NENW	PRIMA OIL AND GAS COMPANY	USFS 4372-24-21UW	GST	STO,CBM,RES	634	740
P145693W	5/21/2002	43	72	24	SWNW	PRIMA OIL AND GAS COMPANY	USFS 4372-24-23UW	GST	STO,CBM,RES	650	742
P145695W	5/21/2002	43	72	24	SWSW	PRIMA OIL AND GAS COMPANY	USFS 4372-24-33UW	GST	STO,CBM,RES	679	740
P145696W	5/21/2002	43	72	24	SWSE	PRIMA OIL AND GAS COMPANY	USFS 4372-24-43UW	GST	STO,CBM,RES	633	680
P145701W	5/21/2002	43	72	24	NESE	PRIMA OIL AND GAS COMPANY	USFS 4372-24-41UW	GST	STO,CBM,RES	611	689
P152895W	7/25/2003	43	72	24	NENE	LANCE OIL & GAS COMPANY, INC	EDWARDS 41-24-4372	GST	STO,CBM	612	730
P152896W	7/25/2003	43	72	24	SWNE	LANCE OIL & GAS COMPANY, INC	EDWARDS 32-24-4372	GST	CBM	618	740
P50480W	9/12/1979	44	70	6	SWNW	ASSOCIATION OF INDEPENDENT CONSULTANTS	ML 4	PUW	MON		
P64729W	7/5/1983	44	70	6	SWNW	NEIL BUTTE COMPANY	ML4	UNA	MON	12.17	25
P11012W	10/27/1971	44	70	7	NWNW	INEXCO OIL CO.	CENTRAL WSW #5 2	ADJ	IND	-1	4940
P11013W	10/27/1971	44	70	7	NWNW	INEXCO OIL CO.	CENTRAL WSW #5 3	PUW	IND		
P28316W	9/24/1974	44	70	7	SWNE	FRANKLIN REALTY	X-2	PUW	MIS	58.5	160
P28317W	9/24/1974	44	70	7	SWNE	FRANKLIN REALTY	X-2 (02)	PUW	MIS	-1	170
P28318W	9/24/1974	44	70	7	NWNW	FRANKLIN REALTY	X-4	PUW	MIS	167.4	275
P28319W	9/24/1974	44	70	7	NWNW	FRANKLIN REALTY	X-4 (02)	PUW	MIS	255	270
P47819W	4/18/1979	44	70	18	NESW	ASSOCIATION OF INDEPENDENT CONSULTANTS	ESSP1	PUW	MON		
P10403W	9/1/1971	44	70	19	SWNW	DALE MILLS	MILLS JOHNSTON #1	PUW	STO	120	190
P121836W	12/27/1999	44	70	19	NWSW	WILLIAMS PRODUCTION RMT, COMPANY	CBM G #13-19	GST	STO,CBM	247	388
P140147W	10/16/2001	44	70	19	NWNW	RIM OPERATING, INC.	CBM G #11-19	GST	STO,CBM	356	465
P142251W	1/18/2002	44	70	19	SENE	RIM OPERATING, INC.	CBM G #22-19	GST	STO,CBM	338	405
P142252W	1/18/2002	44	70	19	SESW	RIM OPERATING, INC.	CBM G #24-19	GST	STO,CBM	289	345
P2974P	6/21/1935	44	70	30	NWSE	MILLS LAND & LIVESTOCK CO., INC.	MILLS #23	PUW	STO	20	60
P121837W	12/27/1999	44	70	30	NWNW	RIM OPERATING, INC	CBM G #11-30	GST	STO,CBM	45	383
P128092W	8/7/2000	44	70	30	NWSW	RIM OPERATING, INC	CBM G 13-30	GST	STO,CBM	214	340
P128093W	8/7/2000	44	70	30	SENE	RIM OPERATING, INC	CBM G 22-30	GST	STO,CBM	219	325

## Supplementary Information on the Affected Environment

Table S4-4. Groundwater Rights for the West Jacobs Ranch LBA Tract (Continued).											
Permit	Priority	T	R	S	QQ	Applicant	Facility Name	Status	Uses	Static WL	T.D.
P128094W	8/7/2000	44	70	30	SESW	RIM OPERATING, INC	CBM G 24-30	GST	STO,CBM	199	325
P128095W	8/7/2000	44	70	30	NWNE	RIM OPERATING, INC	CBM G 31-30	GST	STO,CBM	229	315
P128096W	8/7/2000	44	70	30	NWSE	RIM OPERATING, INC	CBM G 33-30	GST	STO,CBM	217	300
P128097W	8/7/2000	44	70	30	SENE	RIM OPERATING, INC	CBM G 42-30	GST	STO,CBM	283	375
P128098W	8/7/2000	44	70	30	SESE	RIM OPERATING, INC	CBM G 44-30	GST	STO,CBM	226	295
P2975P	12/21/1934	44	70	31	SWNW	MILLS LAND & LIVESTOCK CO., INC.	MILLS #24	PUW	STO	15	60
P120257W	11/1/1999	44	70	31	SESW	RIM OPERATING, INC	CBM G #24-31	GST	STO,CBM	167	262
P121843W	12/27/1999	44	70	31	SESE	RIM OPERATING, INC	CBM G #44-31	UNA	STO,CBM	168	283
P128099W	8/7/2000	44	70	31	NWNW	RIM OPERATING, INC	CBM G 11-31	GST	STO,CBM	196	305
P128100W	8/7/2000	44	70	31	NWSW	RIM OPERATING, INC	CBM G 13-31	GST	STO,CBM	160	245
P128101W	8/7/2000	44	70	31	SENW	RIM OPERATING, INC	CBM G 22-31	GST	STO,CBM	204	308
P128102W	8/7/2000	44	70	31	NWNE	RIM OPERATING, INC	CBM G 31-31	GST	STO,CBM	194	290
P128103W	8/7/2000	44	70	31	NWSE	RIM OPERATING, INC	CBM G 33-31	GST	STO,CBM	183	285
P128104W	8/7/2000	44	70	31	SENE	RIM OPERATING, INC	CBM G 42-31	GST	STO,CBM	211	285
P50478W	9/12/1979	44	71	1	NENW	ASSOCIATION OF INDEPENDENT CONSULTANTS	ML 3	PUW	MON		
P50479W	9/12/1979	44	71	1	NENW	ASSOCIATION OF INDEPENDENT CONSULTANTS	ML 3A	PUW	MON		
P141685W	12/20/2001	44	71	1	NWSW	RIM OPERATING, INC.	CBM C # 13-01	GST	STO,CBM	320	445
P2964P	12/21/1952	44	71	2	NENE	MILLS LAND & LIVESTOCK CO., INC.	MILL #13	PUW	STO	150	170
P2965P	12/21/1927	44	71	2	SENW	MILLS LAND & LIVESTOCK CO., INC.	MILLS #14	PUW	STO	56	60
P141686W	12/20/2001	44	71	2	SESE	RIM OPERATING, INC.	CBM C # 44-02	GST	STO,CBM	425	585
P125047W	4/26/2000	44	71	3	NESW	ALLEN & KAREN TRIGG	TRIGG #1	GST	DOM	73	160
P143201W	3/7/2002	44	71	3	SWSW	RIM OPERATING, INC.	CBM C #14-3	GST	STO,CBM	346	565
P143202W	3/7/2002	44	71	3	NENW	RIM OPERATING, INC.	CBM C #21-3	GST	STO,CBM	299	545
P143203W	3/7/2002	44	71	3	NESW	RIM OPERATING, INC.	CBM C #23-3	GST	STO,CBM	321	565
P143204W	3/7/2002	44	71	3	SWNE	RIM OPERATING, INC.	CBM C #32-3	GST	STO,CBM	302	545
P143205W	3/7/2002	44	71	3	SWSE	RIM OPERATING, INC.	CBM C #34-3	GST	STO,CBM	348	585
P143206W	3/7/2002	44	71	3	NENE	RIM OPERATING, INC.	CBM C #41-3	GST	STO,CBM	285	465
P143207W	3/7/2002	44	71	3	NESE	RIM OPERATING, INC.	CBM C #43-3	GST	STO,CBM	326	565
P143430W	3/25/2002	44	71	3	SWSE	BOLLER/MILLS RANCH	ISENBERGER #1	GST	STO	53.11	120
P85619W	6/28/1991	44	71	4	NESW	MARIE SWINGHOLM	SWINGHOLM #1	UNA	DOM,STO	40	220
P122939W	1/19/2000	44	71	4	SWNW	RIM OPERATING, INC	CBM C #12-4	GST	CBM	411	720
P122940W	1/19/2000	44	71	4	SWSW	RIM OPERATING, INC	CBMC #14-4	GST	CBM	484	720
P122941W	1/19/2000	44	71	4	NENW	RIM OPERATING, INC	CBMC #21-4	GST	CBM	386	665
P122942W	1/19/2000	44	71	4	NESW	RIM OPERATING, INC	CBMC #23-4	GST	CBM	415	725
P122943W	1/19/2000	44	71	4	SWNE	RIM OPERATING, INC	CBMC #32-4	GST	CBM	367	665
P122945W	1/19/2000	44	71	4	NENE	RIM OPERATING, INC	CBMC #41-4	GST	CBM	330	565
P122946W	1/19/2000	44	71	4	NESE	RIM OPERATING, INC	CBMC #43-4	GST	CBM	370	647
P143431W	3/25/2002	44	71	4	SENW	BOLLER/MILLS RANCH	PAPA WELL #1	GST	STO	71.3	120
P161614W	8/19/2004	44	71	4	SWSE	RIM OPERATING, INC.	CBM C #34-4	GST	STO,CBM	247	625
P122947W	1/19/2000	44	71	5	SWNE	RIM OPERATING, INC	CBMC #32-5	GST	CBM	487	765
P122948W	1/19/2000	44	71	5	NENE	RIM OPERATING, INC	CBMC #41-5	GST	CBM	432	705
P122949W	1/19/2000	44	71	5	NESE	RIM OPERATING, INC	CBMC #43-5	GST	CBM	479	720
P137896W	7/23/2001	44	71	5	SWNW	LANCE OIL & GAS COMPANY, INC	BOLLER MILLS RANCH FEDERAL 12-5-4471	GST	CBM	758	861
P137914W	7/23/2001	44	71	5	SWSE	LANCE OIL & GAS COMPANY, INC	SWINGHOLM FEDERAL 34-5-4471	GST	CBM	673	705
P137916W	7/23/2001	44	71	5	NESW	LANCE OIL & GAS COMPANY, INC	BOLLER MILLS RANCH FEDERAL 23-5-4471	GST	CBM	720	920
P137917W	7/23/2001	44	71	5	NENW	LANCE OIL & GAS COMPANY, INC	BOLLER MILLS RANCH FEDERAL 21-5-4471	GST	CBM	723	801
P137921W	7/23/2001	44	71	5	SWSW	LANCE OIL & GAS COMPANY, INC	BOLLER MILLS RANCH FEDERAL 14-5-4471	GST	CBM	641	802
P13290P	12/31/1940	44	71	6	SWSW	DURHAM MEAT CO.	DURHAM MEAT #37	UNA	STO	35	85

**Table S4-4. Groundwater Rights for the West Jacobs Ranch LBA Tract (Continued).**

<b>Permit</b>	<b>Priority</b>	<b>T</b>	<b>R</b>	<b>S</b>	<b>QQ</b>	<b>Applicant</b>	<b>Facility Name</b>	<b>Status</b>	<b>Uses</b>	<b>Static WL</b>	<b>T.D.</b>
P137894W	7/23/2001	44	71	6	NESW	LANCE OIL & GAS COMPANY, INC	DURHAM RANCH FEDERAL 23-6-4471	GST	CBM	635	820
P137902W	7/23/2001	44	71	6	NENE	LANCE OIL & GAS COMPANY, INC	BOLLER MILLS FEDERAL 41-6-4471	GST	CBM	788	875
P137903W	7/23/2001	44	71	6	SWNE	LANCE OIL & GAS COMPANY, INC	BOLLER MILLS FEDERAL 32-6-4471	GST	CBM	819	721
P137907W	7/23/2001	44	71	6	SWSE	LANCE OIL & GAS COMPANY, INC	DURHAM RANCH FEDERAL 34-6-4471	GST	CBM	628	820
P137913W	7/23/2001	44	71	6	SWSW	LANCE OIL & GAS COMPANY, INC	DURHAM RANCH FEDERAL 14-6-4471	GST	CBM	574	640
P137922W	7/23/2001	44	71	6	NESE	LANCE OIL & GAS COMPANY, INC	BOLLER MILLS RANCH FEDERAL 43-6-4471	GST	CBM	789	880
P143421W	3/25/2002	44	71	6	SWSE	BOLLER/MILLS RANCH	WEST HILLS #1	GST	STO	56.68	135
P101220W	1/8/1996	44	71	7	NESE	PAUL R/RUBY H STUART	NORTH HILLS #1	UNA	STO	68	134
P122950W	1/19/2000	44	71	7	SWNW	WILLIAMS PRODUCTION RMT, COMPANY	DURHAM RANCH FED. 12-7-4471	GSI	CBM		
P122951W	1/19/2000	44	71	7	SWSW	WILLIAMS PRODUCTION RMT, COMPANY	DURHAM RANCH FED. 14-7-4471	GSI	CBM		
P122952W	1/19/2000	44	71	7	NESW	WILLIAMS PRODUCTION RMT, COMPANY	STUART FED. 23-7-4471	GSI	CBM		
P122953W	1/19/2000	44	71	7	SWNE	WILLIAMS PRODUCTION RMT, COMPANY	DURHAM RANCH FED. 32-7-4471	GSI	CBM		
P122954W	1/19/2000	44	71	7	SWSE	WILLIAMS PRODUCTION RMT, COMPANY	STUART FED. 34-7-4471	GSI	CBM		
P122955W	1/19/2000	44	71	7	NENE	WILLIAMS PRODUCTION RMT, COMPANY	DURHAM RANCH FED. 41-7-4471	GSI	CBM		
P122956W	1/19/2000	44	71	7	NENW	WILLIAMS PRODUCTION RMT, COMPANY	DURHAM RANCH FED. 21-7-4471	GSI	CBM		
P122957W	1/19/2000	44	71	7	NESE	WILLIAMS PRODUCTION RMT, COMPANY	STUART FED. 43-7-4471	GSI	CBM		
P137898W	7/23/2001	44	71	7	SWSW	LANCE OIL & GAS COMPANY, INC	DURHAM RANCH FEDERAL 14-7-4471	GST	CBM	714	813
P137900W	7/23/2001	44	71	7	SWNW	LANCE OIL & GAS COMPANY, INC	DURHAM RANCH FEDERAL 12-7-4471	GST	CBM	538	594
P137905W	7/23/2001	44	71	7	SWNE	LANCE OIL & GAS COMPANY, INC	DURHAM RANCH FEDERAL 32-7-4471	GST	CBM	340	657
P137909W	7/23/2001	44	71	7	SWSE	LANCE OIL & GAS COMPANY, INC	STUART FEDERAL 34-7- 4471	GST	CBM	790	871
P137930W	7/23/2001	44	71	7	NESW	LANCE OIL & GAS COMPANY, INC	STUART FEDERAL 23-7- 4471	GST	CBM	703	763
P137939W	7/23/2001	44	71	7	NENW	LANCE OIL & GAS COMPANY, INC	DURHAM RANCH FEDERAL 21-7-4471	GST	CBM	625	664
P137941W	7/23/2001	44	71	7	NESE	LANCE OIL & GAS COMPANY, INC	STUART FEDERAL 43-7- 4471	GST	CBM	644	729
P137943W	7/23/2001	44	71	7	NENE	LANCE OIL & GAS COMPANY, INC	DURHAM RANCH FEDERAL 14-7-4472	GST	CBM	696	784
P41842W	2/16/1978	44	71	8	SESE	EARL A. BOLLER	PRAIRIE DOG #1	PUW	STO	127	232
P122958W	1/19/2000	44	71	8	SWNW	LANCE OIL & GAS COMPANY, INC	STUART 12-8-4471	GST	CBM	527	792
P122959W	1/19/2000	44	71	8	NENW	LANCE OIL & GAS COMPANY, INC	STUART 21-8-4471	GST	CBM	535	802
P122960W	1/19/2000	44	71	8	NESW	WILLIAMS PRODUCTION RMT, COMPANY	STUART 23-8-4471	GSI	CBM		
P122961W	1/19/2000	44	71	8	SWSE	WILLIAMS PRODUCTION RMT, COMPANY	STUART 34-8-4471	GSI	CBM		
P128533W	8/17/2000	44	71	8	SWSW	LANCE OIL & GAS COMPANY, INC	STUART FEDERAL 14-8- 4471	GST	CBM	695	835
P128583W	8/22/2000	44	71	8	SWSE	LANCE OIL & GAS COMPANY, INC	STUART 34-8-4471R	GST	CBM		
P137889W	7/23/2001	44	71	8	SWNE	LANCE OIL & GAS COMPANY, INC	BOLLER MILLS RANCH FEDERAL 32-8-4471	GST	CBM	585	610
P137895W	7/23/2001	44	71	8	NESE	LANCE OIL & GAS COMPANY, INC	SWINGHOLM FEDERAL 43-8-4471	GST	CBM	695	766



## Supplementary Information on the Affected Environment

Table S4-4. Groundwater Rights for the West Jacobs Ranch LBA Tract (Continued).											
Permit	Priority	T	R	S	QQ	Applicant	Facility Name	Status	Uses	Static WL	T.D.
P137936W	7/23/2001	44	71	8	NENE	LANCE OIL & GAS COMPANY, INC	SWINGHOLM FEDERAL 41-8-4471	GST	CBM	633	681
P137906W	7/23/2001	44	71	9	SWSW	LANCE OIL & GAS COMPANY, INC	BOLLER MILLS RANCH FEDERAL 14-9-4471	GST	CBM	715	800
P137923W	7/23/2001	44	71	9	NENW	LANCE OIL & GAS COMPANY, INC	SWINGHOLM FEDERAL 21-9-4471	GST	CBM	310	630
P137926W	7/23/2001	44	71	9	NESE	LANCE OIL & GAS COMPANY, INC	BOLLER MILLS RANCH FEDERAL 43-9-4471	GST	CBM	547	741
P137928W	7/23/2001	44	71	9	NENE	LANCE OIL & GAS COMPANY, INC	BOLLER MILLS RANCH FEDERAL 41-9-4471	GST	CBM	503	587
P137929W	7/23/2001	44	71	9	SWSE	LANCE OIL & GAS COMPANY, INC	BOLLER MILLS RANCH FEDERAL 34-9-4471	GST	CBM	422	656
P137931W	7/23/2001	44	71	9	NESW	LANCE OIL & GAS COMPANY, INC	BOLLER MILLS RANCH FEDERAL 23-9-4471	GST	CBM	706	761
P137935W	7/23/2001	44	71	9	SWNW	LANCE OIL & GAS COMPANY, INC	BOLLER MILLS RANCH FEDERAL 12-9-4471	GST	CBM	677	760
P137945W	7/23/2001	44	71	9	SWNE	LANCE OIL & GAS COMPANY, INC	SWINGHOLM FEDERAL 32-9-4471	GST	CBM	359	566
P143429W	3/25/2002	44	71	9	NESE	BOLLER/MILLS RANCH	CIRCLE #1	GST	STO	90.84	145
P165581W	2/28/2005	44	71	9	NENW	LANCE OIL & GAS COMPANY, INC**BOB & JAMIE SWINGHOLM	SWINGHOLM FED 21-9-4471	GSI	STO		
P165582W	2/28/2005	44	71	9	NENE	LANCE OIL & GAS COMPANY, INC**TOM & BONNIE MILLS	BOLLER MILLS RANCH F 41-9-4471	GSI	STO		
P122962W	1/19/2000	44	71	10	NENW	RIM OPERATING, INC	CBMC #21-10	GST	CBM	386	585
P122963W	1/19/2000	44	71	10	NWSE	WILLIAMS PRODUCTION RMT, COMPANY	BOLLER MILLS 33-10-4471	GSI	CBM		
P137924W	7/23/2001	44	71	10	SWSW	LANCE OIL & GAS COMPANY, INC	BOLLER MILLS RANCH FEDERAL 41-10-4471	GST	CBM	618	680
P137925W	7/23/2001	44	71	10	SWNW	LANCE OIL & GAS COMPANY, INC	BOLLER MILLS RANCH FEDERAL 12-10-4471	GST	CBM	454	656
P142248W	1/18/2002	44	71	10	SWNE	RIM OPERATING, INC.	CBM C #32-10	GST	STO,CBM	373	565
P143208W	3/7/2002	44	71	10	NENE	RIM OPERATING, INC.	CBM C #41-10	GST	STO,CBM	402	605
P143427W	3/25/2002	44	71	10	SESE	BOLLER/MILLS RANCH	HARMS #1	GST	DOM	59.3	140
P155325W	10/20/2003	44	71	10	NESE	RIM OPERATING, INC.	CBM C #43-10	GST	CBM,MIS	478	570
P2966P	6/21/1955	44	71	11	NENW	MILLS LAND & LIVESTOCK CO., INC.	MILLS #15	PUW	STO	50	60
P2967P	12/21/1941	44	71	11	NWNE	MILLS LAND & LIVESTOCK CO., INC.	MILLS #16	PUW	STO	75	90
P2969P	4/12/1962	44	71	11	NWSE	MILLS LAND & LIVESTOCK CO., INC.	MILLS #18	PUW	STO	175	233
P115398W	4/22/1999	44	71	11	SWSW	WILLIAM/ELAINE PRIDGEON	PRIDGEON #1		STO	60	174
P140142W	10/16/2001	44	71	11	SENE	RIM OPERATING, INC.	CBM C #42-11	GST	STO,CBM	429	565
P140822W	11/8/2001	44	71	11	SESE	RIM OPERATING, INC.	CBM C # 44-11	GST	STO,CBM	440	565
P142249W	1/18/2002	44	71	11	NWNW	RIM OPERATING, INC.	CBM C #11-11	GST	STO,CBM	333	545
P142250W	1/18/2002	44	71	11	NWSW	RIM OPERATING, INC.	CBM C #13-11	GSE	STO,CBM		
P146100W	7/19/2002	44	71	11	SENW	RIM OPERATING, INC.	CBM C #22-11	GST	STO,CBM	337	535
P146101W	7/19/2002	44	71	11	NWNE	RIM OPERATING, INC.	CBM C #31-11	GST	STO,CBM	359	526
P2968P	12/21/1942	44	71	12	SENW	MILLS LAND & LIVESTOCK CO., INC.	MILLS #17	PUW	STO	165	180
P140823W	11/8/2001	44	71	12	NWSW	RIM OPERATING, INC.	CBM C #13-12	GST	STO,CBM	482	620
P141687W	12/20/2001	44	71	12	NWNW	RIM OPERATING, INC.	CBM C #11-12	GST	STO,CBM	383	545
P146102W	7/19/2002	44	71	12	NWNE	RIM OPERATING, INC.	CBM C # 31-12	GST	STO,CBM	283	365
P148382W	11/8/2002	44	71	12	NWSE	RIM OPERATING, INC.	CBM C #33-12	GST	STO,MIS,CBM	324	445
P2970P	12/21/1939	44	71	13	NESW	MILLS LAND & LIVESTOCK CO., INC.	MILLS #19	PUW	STO	170	190
P140143W	10/16/2001	44	71	13	NWNW	RIM OPERATING, INC.	CBM C #11-13	GST	STO,CBM	491	585
P140144W	10/16/2001	44	71	13	SESW	RIM OPERATING, INC.	CBM C #24-13	GST	STO,CBM	358	446
P140824W	11/8/2001	44	71	13	NWSW	RIM OPERATING, INC.	CBM C #13-13	GST	STO,CBM	429	525
P140825W	11/8/2001	44	71	13	SENW	RIM OPERATING, INC.	CBM C #22-13	GST	STO,CBM	395	505

Table S4-4. Groundwater Rights for the West Jacobs Ranch LBA Tract (Continued).

Permit	Priority	T	R	S	QQ	Applicant	Facility Name	Status	Uses	Static WL	T.D.
P141688W	12/20/2001	44	71	13	SENE	RIM OPERATING, INC.	CBM C # 42-13	GST	STO,CBM	342	445
P148383W	11/8/2002	44	71	13	NWNE	RIM OPERATING, INC.	CBM C #31-13	GST	STO,MIS,CBM	346	465
P148384W	11/8/2002	44	71	13	NWSE	RIM OPERATING, INC.	CBM C #33-13	GST	STO,MIS,CBM	342	465
P6348W	8/17/1970	44	71	14	SWNW	CARL J. SPRINGEN	SPRINGEN #1	PUW	STO	65	104
P106972W	8/1/1997	44	71	14	NESE	BARRETT RESOURCES CORP.	DURHAM RANCH FED. 43-14A	UNA	MON	26	820
P137892W	7/23/2001	44	71	14	NENW	WILLIAMS PRODUCTION RMT, COMPANY	BOLLER MILLS RANCH FEDERAL 21-14-4471	GST	CBM	397	497
P140826W	11/8/2001	44	71	14	NWNE	RIM OPERATING, INC.	CBM C #31-14	GST	STO,CBM	376	525
P148385W	11/8/2002	44	71	14	SWNW	RIM OPERATING, INC.	CBM C #12-14	GST	STO,MIS,CBM	349	505
P148386W	11/8/2002	44	71	14	NWSE	RIM OPERATING, INC.	CBM C #33-14	GST	STO,MIS,CBM	368	485
P148387W	11/8/2002	44	71	14	SESE	RIM OPERATING, INC.	CBM C #44-14	GST	STO,MIS,CBM	376	465
P122965W	1/19/2000	44	71	15	NWNW	WILLIAMS PRODUCTION RMT, COMPANY	MILLS 11-15-4471	GSI	CBM		
P122966W	1/19/2000	44	71	15	SENE	WILLIAMS PRODUCTION RMT, COMPANY	MILLS 22-15-4471	GSI	CBM		
P122967W	1/19/2000	44	71	15	SWNE	LANCE OIL & GAS COMPANY, INC	MILLS 32-15-4471	GST	CBM	67	605
P122968W	1/19/2000	44	71	15	NENE	LANCE OIL & GAS COMPANY, INC	MILLS 41-15-4471	GST	CBM	99	560
P128534W	8/17/2000	44	71	15	SWSW	LANCE OIL & GAS COMPANY, INC	MILLS FEDERAL 14-15-4471	GST	CBM	92	682
P128535W	8/17/2000	44	71	15	NESW	LANCE OIL & GAS COMPANY, INC	MILLS FEDERAL 23-15-4471	GST	CBM	136	597
P142372W	1/31/2002	44	71	15	SWNW	LANCE OIL & GAS COMPANY, INC	MILLS 12-15-4471	GST	CBM	599	692
P142374W	1/31/2002	44	71	15	NENW	LANCE OIL & GAS COMPANY, INC	MILLS 21-15-4471	GST	CBM	643	727
P38077W	6/2/1977	44	71	16	SWSE	WY BOARD OF LAND COMMISSIONERS** THUNDER BASIN COAL COMPANY	WCH 2A	PUW	MON	63	675
P38078W	6/2/1977	44	71	16	SWSE	WY BOARD OF LAND COMMISSIONERS** THUNDER BASIN COAL COMPANY	WCH 2B	PUW	MON	67	718
P40084W	9/28/1977	44	71	16	SENE	GAME & FISH COMM., STATE OF WYOMING** THUNDER BASIN COAL COMPANY	WCH 2D	PUW	MON	-1	763
P40085W	9/28/1977	44	71	16	NWNW	GAME & FISH COMM., STATE OF WYOMING** THUNDER BASIN COAL COMPANY	WCH 2E	PUW	MON	330	768
P40361W	8/26/1977	44	71	16	SWSE	GAME & FISH COMM., STATE OF WYOMING**ATLANTIC RICHFIELD COMPANY	WCH-2C	PUW	MON		
P40766W	11/7/1977	44	71	16	SENE	WY BOARD OF LAND COMMISSIONERS** THUNDER BASIN COAL COMPANY	WCH 2F	PUW	MON	358	884
P40773W	11/7/1977	44	71	16	SENE	GAME & FISH COMM., STATE OF WYOMING**ATLANTIC RICHFIELD COMPANY	WCH 2G	PUW	MON		
P41843W	2/16/1978	44	71	16	SENE	WY BOARD OF LAND COMMISSIONERS** ATLANTIC RICHFIELD COMPANY	RH L - P - 3	PUW	RES,MIS		
P41844W	2/16/1978	44	71	16	NWNE	WY BOARD OF LAND COMMISSIONERS** ATLANTIC RICHFIELD COMPANY	RH 1 MCA 6	PUW	MON		
P41845W	2/16/1978	44	71	16	SENE	WY BOARD OF LAND COMMISSIONERS** ATLANTIC RICHFIELD COMPANY	RH 1-MCA-7	PUW	MIS		
P41846W	2/16/1978	44	71	16	SENE	WY BOARD OF LAND COMMISSIONERS** ATLANTIC RICHFIELD COMPANY	RH 1 IW 1	PUW	MON	340	742
P41847W	2/16/1978	44	71	16	SENE	WY BOARD OF LAND COMMISSIONERS** ATLANTIC RICHFIELD COMPANY	RH 1 IW 2	PUW	MON	340	744
P41848W	2/16/1978	44	71	16	SENE	WY BOARD OF LAND COMMISSIONERS** ATLANTIC RICHFIELD COMPANY	RH 1 IW 3	PUW	MON	340	744
P41849W	2/16/1978	44	71	16	SENE	WY BOARD OF LAND COMMISSIONERS** ATLANTIC RICHFIELD COMPANY	RH 1-IW-4	PUW	MON		
P41850W	2/16/1978	44	71	16	SENE	WY BOARD OF LAND COMMISSIONERS** ATLANTIC RICHFIELD COMPANY	RH 1 IW 5	PUW	MON	340	742
P41851W	2/16/1978	44	71	16	SENE	WY BOARD OF LAND COMMISSIONERS** ATLANTIC RICHFIELD COMPANY	RH 1 IW 6	PUW	MON	340	742

## Supplementary Information on the Affected Environment

Table S4-4. Groundwater Rights for the West Jacobs Ranch LBA Tract (Continued).											
Permit	Priority	T	R	S	QQ	Applicant	Facility Name	Status	Uses	Static WL	T.D.
P41852W	2/16/1978	44	71	16	SENW	WY BOARD OF LAND COMMISSIONERS** ATLANTIC RICHFIELD COMPANY	RH 1 IW 7	PUW	MON	340	772
P41853W	2/16/1978	44	71	16	SENW	WY BOARD OF LAND COMMISSIONERS** ATLANTIC RICHFIELD COMPANY	RH 1-IW-8	PUW	MON		
P41854W	2/16/1978	44	71	16	SENW	WY BOARD OF LAND COMMISSIONERS** ATLANTIC RICHFIELD COMPANY	RH 1-P-1	PUW	MIS		
P41855W	2/16/1978	44	71	16	SENW	WY BOARD OF LAND COMMISSIONERS** ATLANTIC RICHFIELD COMPANY	RH 1-P-2	PUW	MIS		
P41856W	2/16/1978	44	71	16	SENW	WY BOARD OF LAND COMMISSIONERS** ATLANTIC RICHFIELD COMPANY	RH 1-MUA-1	PUW	MIS		
P41857W	2/16/1978	44	71	16	SENW	WY BOARD OF LAND COMMISSIONERS** ATLANTIC RICHFIELD COMPANY	RH 1-MUA-2	PUW	MON		
P41858W	2/16/1978	44	71	16	SENW	WY BOARD OF LAND COMMISSIONERS** ATLANTIC RICHFIELD COMPANY	RH 1-MUA-3	PUW	MON		
P41859W	2/16/1978	44	71	16	SENW	WY BOARD OF LAND COMMISSIONERS** ATLANTIC RICHFIELD COMPANY	RH 1-MUA-5	PUW	MON		
P41860W	2/16/1978	44	71	16	SENW	WY BOARD OF LAND COMMISSIONERS** ATLANTIC RICHFIELD COMPANY	RH 1-MCA-2	PUW	MON		
P41861W	2/16/1978	44	71	16	SENW	WY BOARD OF LAND COMMISSIONERS** ATLANTIC RICHFIELD COMPANY	RH 1-MCA-3	PUW	MON		
P41862W	2/16/1978	44	71	16	SENW	WY BOARD OF LAND COMMISSIONERS** ATLANTIC RICHFIELD COMPANY	RH 1 WC 1	PUW	RES,MIS		
P41863W	2/16/1978	44	71	16	SENW	WY BOARD OF LAND COMMISSIONERS** ATLANTIC RICHFIELD COMPANY	RH 1 WC 2	PUW	DEW		
P41864W	2/16/1978	44	71	16	SENW	WY BOARD OF LAND COMMISSIONERS** ATLANTIC RICHFIELD COMPANY	RH 1 WC 3	PUW	RES,MIS		
P41865W	2/16/1978	44	71	16	SENW	WY BOARD OF LAND COMMISSIONERS** ATLANTIC RICHFIELD COMPANY	RH 1 DW 4	PUW	RES,MIS		
P41866W	2/16/1978	44	71	16	SENW	WY BOARD OF LAND COMMISSIONERS** ATLANTIC RICHFIELD COMPANY	RH 1 WC 5	PUW	RES,MIS		
P41867W	2/16/1978	44	71	16	SENW	WY BOARD OF LAND COMMISSIONERS** ATLANTIC RICHFIELD COMPANY	RH 1-WC-6	PUW	RES,MIS		
P42325W	3/10/1978	44	71	16	SENW	WY BOARD OF LAND COMMISSIONERS** ATLANTIC RICHFIELD COMPANY	RH1 IW 9	PUW	MON		
P42326W	3/10/1978	44	71	16	SENW	WY BOARD OF LAND COMMISSIONERS** ATLANTIC RICHFIELD COMPANY	RH1 IW 10	PUW	MON		
P42327W	3/10/1978	44	71	16	SENW	WY BOARD OF LAND COMMISSIONERS** ATLANTIC RICHFIELD COMPANY	RH1 IW 11	PUW	MON		
P42328W	3/10/1978	44	71	16	SENW	WY BOARD OF LAND COMMISSIONERS** ATLANTIC RICHFIELD COMPANY	RH1 IW 12	PUW	MON		
P42329W	3/10/1978	44	71	16	SENW	WY BOARD OF LAND COMMISSIONERS** ATLANTIC RICHFIELD COMPANY	RH1 IW 13	PUW	MON		
P42330W	3/10/1978	44	71	16	SENW	GAME & FISH COMM., STATE OF WYOMING** ATLANTIC RICHFIELD COMPANY	RH1 IW 14	PUW	MON		
P42971W	4/24/1978	44	71	16	SENW	WY BOARD OF LAND COMMISSIONERS** THUNDER BASIN COAL COMPANY	RH1 HFEM 1	PUW	MON	340	772
P42972W	4/24/1978	44	71	16	SENW	WY BOARD OF LAND COMMISSIONERS** ATLANTIC RICHFIELD COMPANY	RH1-HFEM-2	PUW	MIS		
P42973W	4/24/1978	44	71	16	SENW	WY BOARD OF LAND COMMISSIONERS** THUNDER BASIN COAL COMPANY	RH1 HFM 3	PUW	MON	340	772
P42974W	4/24/1978	44	71	16	SENW	WY BOARD OF LAND COMMISSIONERS** THUNDER BASIN COAL COMPANY	RH1 HFEM 4	PUW	MON	340	772
P42975W	4/24/1978	44	71	16	SENW	WY BOARD OF LAND COMMISSIONERS** ATLANTIC RICHFIELD COMPANY	RH1-HFEM-5	PUW	MON		

**Table S4-4. Groundwater Rights for the West Jacobs Ranch LBA Tract (Continued).**

<b>Permit</b>	<b>Priority</b>	<b>T</b>	<b>R</b>	<b>S</b>	<b>QQ</b>	<b>Applicant</b>	<b>Facility Name</b>	<b>Status</b>	<b>Uses</b>	<b>Static WL</b>	<b>T.D.</b>
P42976W	4/24/1978	44	71	16	SENW	WY BOARD OF LAND COMMISSIONERS** THUNDER BASIN COAL COMPANY	RH1 HFEM 6	PUW	MON	340	772
P42977W	4/24/1978	44	71	16	SENW	WY BOARD OF LAND COMMISSIONERS** ATLANTIC RICHFIELD COMPANY	RH1 HFEM 7	PUW	MON		
P42978W	4/24/1978	44	71	16	SENW	WY BOARD OF LAND COMMISSIONERS** ATLANTIC RICHFIELD COMPANY	RH1-HFEM-8	PUW	MON		
P49662W	8/17/1979	44	71	16	SENW	WY BOARD OF LAND COMMISSIONERS	RH1-P-2-B	PUW	MON	325	750
P52363W	3/28/1980	44	71	16	NWNW	WY BOARD OF LAND COMMISSIONERS**ATLANTIC RICHFIELD COMPANY	ROCKY HILL W 1	PUW	MON		
P52364W	3/28/1980	44	71	16	NENE	WY BOARD OF LAND COMMISSIONERS**ATLANTIC RICHFIELD COMPANY	ROCKY HILL W 2	PUW	MON		
P52365W	3/28/1980	44	71	16	NENE	WY BOARD OF LAND COMMISSIONERS** THUNDER BASIN COAL COMPANY	RH W1	PUW	MON	360	750
P52366W	3/28/1980	44	71	16	SWSW	WY BOARD OF LAND COMMISSIONERS**ATLANTIC RICHFIELD COMPANY	RH-W2	PUW	MON		
P52367W	3/28/1980	44	71	16	SWNW	WY BOARD OF LAND COMMISSIONERS** THUNDER BASIN COAL COMPANY	RH W3	PUW	MON	300	695
P52575W	6/23/1980	44	71	16	SWNW	WY BOARD OF LAND COMMISSIONERS** THUNDER BASIN COAL COMPANY	ROCKY HILL S 2	PUW	MON	290	545
P52576W	6/23/1980	44	71	16	SWNW	WY BOARD OF LAND COMMISSIONERS** THUNDER BASIN COAL COMPANY	ROCKY HILL S 1	PUW	MON	115	230
P52578W	6/23/1980	44	71	16	SWNW	WY BOARD OF LAND COMMISSIONERS** THUNDER BASIN COAL COMPANY	RH W5	PUW	MON	300	655
P52579W	6/23/1980	44	71	16	NWNE	WY BOARD OF LAND COMMISSIONERS**ATLANTIC RICHFIELD COMPANY	ROCKY HILL W 8	PUW	MON		
P52580W	6/23/1980	44	71	16	NWNE	WY BOARD OF LAND COMMISSIONERS**ATLANTIC RICHFIELD COMPANY	ROCKY HILL W 9	PUW	MON		
P52581W	6/23/1980	44	71	16	NWNE	WY BOARD OF LAND COMMISSIONERS**ATLANTIC RICHFIELD COMPANY	ROCKY HILL W 10	PUW	MON		
P52582W	6/23/1980	44	71	16	NWNE	WY BOARD OF LAND COMMISSIONERS**ATLANTIC RICHFIELD COMPANY	ROCKY HILL W-11	PUW	MON		
P52583W	6/23/1980	44	71	16	NWNE	WY BOARD OF LAND COMMISSIONERS**ATLANTIC RICHFIELD COMPANY	ROCKY HILL S 3	PUW	MON		
P52584W	6/23/1980	44	71	16	NWNE	WY BOARD OF LAND COMMISSIONERS**ATLANTIC RICHFIELD COMPANY	ROCKY HILL S 4	PUW	MON		
P53542W	8/7/1981	44	71	16	SWNW	WY BOARD OF LAND COMMISSIONERS**ATLANTIC RICHFIELD COMPANY	ROCKY HILL SA-1	PUW	MON		
P53543W	9/7/1980	44	71	16	SWNW	WY BOARD OF LAND COMMISSIONERS**ATLANTIC RICHFIELD COMPANY	ROCKY HILL SA-2	PUW	MON		
P53545W	9/7/1980	44	71	16	NWNW	WY BOARD OF LAND COMMISSIONERS**ATLANTIC RICHFIELD COMPANY	ROCKY HILL WA-7	PUW	MON		
P54321W	10/20/1980	44	71	16	SENW	WY BOARD OF LAND COMMISSIONERS** THUNDER BASIN COAL COMPANY	ROCKY HILL MOS-1	PUW	MON		
P54322W	10/20/1980	44	71	16	SENW	WY BOARD OF LAND COMMISSIONERS** THUNDER BASIN COAL COMPANY	RH OBUA4	PUW	MON		
P54323W	10/20/1980	44	71	16	SENW	WY BOARD OF LAND COMMISSIONERS** THUNDER BASIN COAL COMPANY	RHMLA 1	PUW	MON		
P54646W	11/20/1980	44	71	16	NESE	WY BOARD OF LAND COMMISSIONERS**EARL BOLLER	JUMPOFF #1	PUW	MON,STO,MIS	275	325
P55911W	3/9/1981	44	71	16	SENW	WY BOARD OF LAND COMMISSIONERS** THUNDER BASIN COAL COMPANY	ROCKY HILL C 9	PUW	MON	340	690
P55912W	3/9/1981	44	71	16	SENW	WY BOARD OF LAND COMMISSIONERS** THUNDER BASIN COAL COMPANY	ROCKY HILL C 7	PUW	MON	340	758
P55913W	3/9/1981	44	71	16	SENW	WY BOARD OF LAND COMMISSIONERS** THUNDER BASIN COAL COMPANY	ROCKY HILL C-6	PUW	MON	340	733

## Supplementary Information on the Affected Environment

Table S4-4. Groundwater Rights for the West Jacobs Ranch LBA Tract (Continued).											
Permit	Priority	T	R	S	QQ	Applicant	Facility Name	Status	Uses	Static WL	T.D.
P55914W	3/9/1981	44	71	16	SENW	WY BOARD OF LAND COMMISSIONERS** THUNDER BASIN COAL COMPANY	ROCKY HILL C 5	PUW	MON	340	660
P55915W	3/9/1981	44	71	16	SENW	WY BOARD OF LAND COMMISSIONERS** THUNDER BASIN COAL COMPANY	ROCKY HILL C 4	PUW	MON	340	690
P55916W	3/9/1981	44	71	16	SENW	WY BOARD OF LAND COMMISSIONERS** THUNDER BASIN COAL COMPANY	ROCKY HILL C 2	PUW	MON	340	782
P55917W	3/9/1981	44	71	16	NENW	WY BOARD OF LAND COMMISSIONERS** THUNDER BASIN COAL COMPANY	ROCKY HILL OBCA 3	PUW	MON	347	780
P55918W	3/9/1981	44	71	16	SENW	WY BOARD OF LAND COMMISSIONERS** THUNDER BASIN COAL COMPANY	ROCKY HILL OBCA-2	PUW	MON	324	755
P55919W	3/9/1981	44	71	16	SENW	WY BOARD OF LAND COMMISSIONERS** THUNDER BASIN COAL COMPANY	ROCKY HILL OBCA-1	PUW	MON	329	740
P55920W	3/9/1981	44	71	16	NENW	WY BOARD OF LAND COMMISSIONERS** THUNDER BASIN COAL COMPANY	ROCKY HILL OBUA-3	PUW	MON	138.5	260
P55921W	3/9/1981	44	71	16	SENW	WY BOARD OF LAND COMMISSIONERS** THUNDER BASIN COAL COMPANY	ROCKY HILL OBUA 2	PUW	MON	135.3	220
P55922W	3/9/1981	44	71	16	SENW	WY BOARD OF LAND COMMISSIONERS** THUNDER BASIN COAL COMPANY	ROCKY HILL OBU4 1	PUW	MON	137	240
P66656W	3/16/1984	44	71	16	SENW	WY BOARD OF LAND COMMISSIONERS** THUNDER BASIN COAL COMPANY	ROCKY HILL R-1	PUW	MON	240	740
P66657W	3/16/1984	44	71	16	SENW	WY BOARD OF LAND COMMISSIONERS** THUNDER BASIN COAL COMPANY	ROCKY HILL R-2	PUW	MON	340	730
P66658W	3/16/1984	44	71	16	SENW	WY BOARD OF LAND COMMISSIONERS** THUNDER BASIN COAL COMPANY	ROCKY HILL R-3	PUW	MON	340	739
P66659W	3/16/1984	44	71	16	SENW	WY BOARD OF LAND COMMISSIONERS** THUNDER BASIN COAL COMPANY	ROCKY HILL R-4	PUW	MON	340	739
P66660W	3/16/1984	44	71	16	SENW	WY BOARD OF LAND COMMISSIONERS** THUNDER BASIN COAL COMPANY	ROCKY HILL R-5	PUW	MON	320	746
P67981W	7/25/1984	44	71	16	SENW	WY BOARD OF LAND COMMISSIONERS** THUNDER BASIN COAL COMPANY	RH 1 MUA 2	PUW	MIS	140	210
P69280W	7/20/1984	44	71	16	SWSW	WY BOARD OF LAND COMMISSIONERS** THUNDER BASIN COAL COMPANY	WCH 2C	PUW	MON	319.5	696
P69281W	7/20/1984	44	71	16	SENW	WY BOARD OF LAND COMMISSIONERS** THUNDER BASIN COAL COMPANY	RH-1-P-3	PUW	MON	340	752
P69282W	7/20/1984	44	71	16	SENW	WY BOARD OF LAND COMMISSIONERS** THUNDER BASIN COAL COMPANY	RH 1 - MCA-1	PUW	MON	354	755
P69283W	7/20/1984	44	71	16	SENW	WY BOARD OF LAND COMMISSIONERS** THUNDER BASIN COAL COMPANY	RH-1-DW-1	PUW	MON	340	744
P69284W	7/20/1984	44	71	16	SENW	WY BOARD OF LAND COMMISSIONERS** THUNDER BASIN COAL COMPANY	RH-1-DW-2	PUW	MON	340	743
P69285W	7/20/1984	44	71	16	SENW	WY BOARD OF LAND COMMISSIONERS** THUNDER BASIN COAL COMPANY	RH-1-DW-3	PUW	MON	340	743
P69286W	7/20/1984	44	71	16	SENW	WY BOARD OF LAND COMMISSIONERS** THUNDER BASIN COAL COMPANY	RH-1-DW-4	PUW	MON	340	746
P69287W	7/20/1984	44	71	16	SWNW	WY BOARD OF LAND COMMISSIONERS** THUNDER BASIN COAL COMPANY	ROCKY HILL W 2	PUW	MON	300	698
P121862W	12/29/1999	44	71	16	SWSW	WY STATE BOARD OF LAND COMMISSIONERS** LANCE OIL & GAS COMPANY, INC	STATE 14-16-4471	GST	CBM	409	692
P121863W	12/29/1999	44	71	16	NESW	WY STATE BOARD OF LAND COMMISSIONERS** LANCE OIL & GAS COMPANY, INC	STATE 23-16-4471	GST	CBM	412	690
P121864W	12/29/1999	44	71	16	SWSE	WY STATE BOARD OF LAND COMMISSIONERS** LANCE OIL & GAS COMPANY, INC	STATE 34-16-4471	GST	CBM	422	702
P122969W	1/19/2000	44	71	16	SWNW	WY STATE BOARD OF LAND COMMISSIONERS** LANCE OIL & GAS COMPANY, INC	STATE 12-16-4471	GST	CBM	404	710

**Table S4-4. Groundwater Rights for the West Jacobs Ranch LBA Tract (Continued).**

<b>Permit</b>	<b>Priority</b>	<b>T</b>	<b>R</b>	<b>S</b>	<b>QQ</b>	<b>Applicant</b>	<b>Facility Name</b>	<b>Status</b>	<b>Uses</b>	<b>Static WL</b>	<b>T.D.</b>
P122970W	1/19/2000	44	71	16	NENW	WY STATE BOARD OF LAND COMMISSIONERS** LANCE OIL & GAS COMPANY, INC	STATE 21-16-4471	GST	CBM	535	823
P122971W	1/19/2000	44	71	16	SWNE	WY STATE BOARD OF LAND COMMISSIONERS** LANCE OIL & GAS COMPANY, INC	STATE 32-16-4471	GST	CBM	521	810
P122972W	1/19/2000	44	71	16	NENE	WY STATE BOARD OF LAND COMMISSIONERS** LANCE OIL & GAS COMPANY, INC	STATE 41-16-4471	GST	CBM	475	750
P122973W	1/19/2000	44	71	16	NESE	WY STATE BOARD OF LAND COMMISSIONERS** LANCE OIL & GAS COMPANY, INC	STATE 43-16-4471	GST	CBM	483	735
P143422W	3/25/2002	44	71	16	NESE	WY STATE BOARD OF LAND COMMISSIONERS** BOLLER/MILLS RANCH	SCHOOL SECTION #1	GST	STO	100	300
P112760W	11/9/1998	44	71	17	SWSW	LANCE OIL & GAS COMPANY, INC	E FORK FLOCCHINI 14-17	GST	CBM	616	754
P122974W	1/19/2000	44	71	17	SWSE	LANCE OIL & GAS COMPANY, INC	BOLLER MILLS 34-17-4471	GST	CBM	168	747
P123996W	3/13/2000	44	71	17	SWNW	LANCE OIL & GAS COMPANY, INC	DURHAM RANCH 12-17-4471	GST	CBM	603	810
P128536W	8/17/2000	44	71	17	NESW	LANCE OIL & GAS COMPANY, INC	BOLLER MILLS FEDERAL 23-17-4471	GST	CBM	539	761
P128537W	8/17/2000	44	71	17	NESE	LANCE OIL & GAS COMPANY, INC	BOLLER MILLS FEDERAL 43-17-4471	GST	CBM	688	762
P137890W	7/23/2001	44	71	17	NENE	LANCE OIL & GAS COMPANY, INC	BOLLER MILLS RANCH FEDERAL 41-17-4471	GST	CBM	676	759
P137891W	7/23/2001	44	71	17	SWNE	LANCE OIL & GAS COMPANY, INC	BOLLER MILLS RANCH FEDERAL 32-17-4471	GST	CBM	590	802
P137893W	7/23/2001	44	71	17	NENW	LANCE OIL & GAS COMPANY, INC	BOLLER MILLS RANCH FEDERAL 21-17-4471	GST	CBM	260	630
P16588W	11/21/1972	44	71	18	SWNE	DURHAM RANCHES INC.	DURHAM #52	PUW	STO	215	290
P107569W	7/28/1997	44	71	18	SWNW	LANCE OIL & GAS COMPANY, INC	DURHAM RANCH FED. 1-12-18	GST	CBM,MIS	431	900
P110772W	6/22/1998	44	71	18	NWNW	LANCE OIL & GAS COMPANY, INC	EAST FORK FEDERAL 11-18	GST	CBM	418	861
P112054W	10/6/1998	44	71	18	NENE	LANCE OIL & GAS COMPANY, INC	EAST FORK FLOCCHINI 41-18	GST	CBM	592	841
P112761W	11/9/1998	44	71	18	SESE	LANCE OIL & GAS COMPANY, INC	E FORK FLOCCHINI 44-18	GST	CBM	707	793
P113319W	12/14/1998	44	71	18	NWNE	LANCE OIL & GAS COMPANY, INC	E FORK FLOCCHINI 31-18	GST	CBM	615	810
P128538W	8/17/2000	44	71	18	NENW	LANCE OIL & GAS COMPANY, INC	DURHAM RANCH FEDERAL 21-18-4471	GST	CBM	656	828
P128539W	8/17/2000	44	71	18	SWSE	LANCE OIL & GAS COMPANY, INC	DURHAM RANCH FEDERAL 34-18-4471	GST	CBM	817	887
P128541W	8/17/2000	44	71	18	NESW	LANCE OIL & GAS COMPANY, INC	DURHAM RANCH FEDERAL 23-18-4471	GST	CBM	766	857
P137934W	7/23/2001	44	71	18	SWSW	LANCE OIL & GAS COMPANY, INC	EAST FORK FERERAL 14-18	GSI	CBM		
P112052W	10/6/1998	44	71	19	NESE	LANCE OIL & GAS COMPANY, INC	EAST FORK FLOCCHINI 43-19	GST	CBM	736	781
P112053W	10/6/1998	44	71	19	NENE	LANCE OIL & GAS COMPANY, INC	EAST FORK FLOCCHINI 41-19	GST	CBM	361	761
P113783W	1/25/1999	44	71	19	SENE	LANCE OIL & GAS COMPANY, INC	E FORK FLOCCHINI 42-19	GST	STO,CBM	650	790
P128465W	8/17/2000	44	71	19	SWSE	LANCE OIL & GAS COMPANY, INC	DURHAM RANCH FEDERAL 34-19-4471	GST	CBM	821	886
P128466W	8/17/2000	44	71	19	SWNE	LANCE OIL & GAS COMPANY, INC	DURHAM RANCH FEDERAL 32-19-4471	GSI	CBM	793	841

## Supplementary Information on the Affected Environment

Table S4-4. Groundwater Rights for the West Jacobs Ranch LBA Tract (Continued).											
Permit	Priority	T	R	S	QQ	Applicant	Facility Name	Status	Uses	Static WL	T.D.
P137897W	7/23/2001	44	71	19	NENW	LANCE OIL & GAS COMPANY, INC	DURHAM RANCH FEDERAL 21-19-4471	GST	CBM	866	1000
P137899W	7/23/2001	44	71	19	SWSW	LANCE OIL & GAS COMPANY, INC	DURHAM RANCH FEDERAL 14-19-4471	GST	CBM	820	932
P137901W	7/23/2001	44	71	19	SWNW	LANCE OIL & GAS COMPANY, INC	DURHAM RANCH FEDERAL 12-19-4471	GST	CBM	776	940
P137918W	7/23/2001	44	71	19	NESW	LANCE OIL & GAS COMPANY, INC	DURHAM RANCH FEDERAL 23-19-4471	GST	CBM	838	918
P13289P	12/31/1943	44	71	20	NWSW	DURHAM MEAT CO.	DURHAM MEAT #36	PUW	STO	66	108
P112051W	10/6/1998	44	71	20	SWNW	LANCE OIL & GAS COMPANY, INC	EAST FORK FLOCCHINI 12-20	GST	CBM	761	792
P113318W	12/14/1998	44	71	20	NWNW	LANCE OIL & GAS COMPANY, INC	E FORK FLOCCHINI 11- 20	GST	CBM	750	781
P121865W	12/29/1999	44	71	20	NENW	LANCE OIL & GAS COMPANY, INC	BOLLER-MILLS 21-20- 4471	GST	CBM	410	802
P121866W	12/29/1999	44	71	20	NESW	LANCE OIL & GAS COMPANY, INC	BOLLER-MILLS 23-20- 4471	GST	CBM	390	747
P121867W	12/29/1999	44	71	20	SWNE	LANCE OIL & GAS COMPANY, INC	BOLLER-MILLS 32-20- 4471	GST	CBM	372	722
P121868W	12/29/1999	44	71	20	SWSW	LANCE OIL & GAS COMPANY, INC	BOLLER-MILLS 34-20- 4471	GST	CBM	334	686
P121869W	12/29/1999	44	71	20	NESE	LANCE OIL & GAS COMPANY, INC	BOLLER-MILLS 43-20- 4471	GST	CBM	331	642
P123995W	3/13/2000	44	71	20	SWSW	LANCE OIL & GAS COMPANY, INC	DURHAM RANCH 14-20- 4471	GST	CBM	93	801
P137920W	7/23/2001	44	71	20	NENE	LANCE OIL & GAS COMPANY, INC	BOLLER MILLS FEDERAL 41-20-4471	GST	CBM	678	710
P33051W	5/3/1976	44	71	21	SWSE	EARL A. BOLLER	BOLLER #2	PUW	DOM,STO		
P121870W	12/29/1999	44	71	21	SWNW	LANCE OIL & GAS COMPANY, INC	DOROUGH TRUST 12- 21-4471	GST	CBM	344	630
P121871W	12/29/1999	44	71	21	SWSW	LANCE OIL & GAS COMPANY, INC	DOROUGH TRUST 14- 21-4471	GST	CBM	312	623
P121872W	12/29/1999	44	71	21	NENW	LANCE OIL & GAS COMPANY, INC	DOROUGH TRUST 21- 21-4471	GST	CBM	352	661
P121873W	12/29/1999	44	71	21	NESW	LANCE OIL & GAS COMPANY, INC	DOROUGH TRUST 23- 21-4471	GST	CBM	328	590
P121874W	12/29/1999	44	71	21	SWNE	WILLIAMS PRODUCTION RMT COMPANY** LANCE OIL & GAS COMPANY, INC	DOROUGH TRUST 32- 21-4471	GST	CBM	345	630
P121875W	12/29/1999	44	71	21	SWSE	LANCE OIL & GAS COMPANY, INC	DOROUGH TRUST 34- 21-4471	GST	CBM	314	580
P121876W	12/29/1999	44	71	21	NENE	LANCE OIL & GAS COMPANY, INC	DOROUGH TRUST 41- 21-4471	GST	CBM	484	763
P121877W	12/29/1999	44	71	21	NESE	LANCE OIL & GAS COMPANY, INC	DOROUGH TRUST 43- 21-4471	GST	CBM	364	650
P143425W	3/25/2002	44	71	21	SENE	BOLLER/MILLS RANCH	RANCH HOUSE WELL #1	GST	DOM,STO	59.3	140
P3214P	8/24/1928	44	71	22	SESE	FERIBA F. FERGUSON	FERGUSON #1	PUW	DOM,STO	35	50
P128463W	8/17/2000	44	71	22	NENW	LANCE OIL & GAS COMPANY, INC	MILLS FEDERAL 21-22- 4471	GST	CBM	46	602
P128464W	8/17/2000	44	71	22	SWNW	LANCE OIL & GAS COMPANY, INC	MILLS FEDERAL 12-22- 4471	GST	CBM	44	706
P142373W	1/31/2002	44	71	22	NESE	LANCE OIL & GAS COMPANY, INC	FERGUSON 43-2-4471	GSI	CBM		
P145781W	6/26/2002	44	71	22	SWSW	DAVID D. FERGUSON, ET AL.** COLEMAN OIL & GAS, INC.	FERGUSON #14-22	GST	CBM	522	603
P145782W	6/26/2002	44	71	22	NESW	DAVID D. FERGUSON, ET AL.** COLEMAN OIL & GAS, INC.	FERGUSON #23-22	GST	CBM	499	573

Table S4-4. Groundwater Rights for the West Jacobs Ranch LBA Tract (Continued).

Permit	Priority	T	R	S	QQ	Applicant	Facility Name	Status	Uses	Static WL	T.D.
P145785W	6/26/2002	44	71	22	SWSE	DAVID D. FERGUSON, ET AL.** COLEMAN OIL & GAS, INC.	FERGUSON #34-22	GST	CBM	422	502
P2971P	12/21/1938	44	71	23	NWNE	MILLS LAND & LIVESTOCK CO., INC.	MILLS #20	PUW	STO	60	90
P2972P	9/3/1963	44	71	23	NWSE	MILLS LAND & LIVESTOCK CO., INC.	MILLS #21	GST	STO	12	42
P121841W	12/27/1999	44	71	23	NWSE	RIM OPERATING, INC	CBM C #33-23	GST	STO,CBM	198	369
P121842W	12/27/1999	44	71	23	NWNE	RIM OPERATING, INC	CBM C #31-23	GST	STO,CBM	232	415
P123654W	2/28/2000	44	71	23	SESE	RIM OPERATING, INC	CBM C #44-23	GST	STO,CBM	214	365
P123655W	2/28/2000	44	71	23	SENE	RIM OPERATING, INC	CBM C #42-23	GST	STO,CBM	226	395
P19252P	12/31/1920	44	71	24	NESW	ARK LAND COMPANY	REVLAND #4	UNA	STO	-1	75
P123653W	2/28/2000	44	71	24	NWNW	RIM OPERATING, INC	CBM C #11-24	GST	STO,CBM	272	407
P123656W	2/28/2000	44	71	24	NWSW	WILLIAMS PRODUCTION RMT, COMPANY	CBM C #13-24	GST	STO,CBM	226	371
P123892W	3/6/2000	44	71	24	SESW	RIM OPERATING, INC	CBM C #24-24	GST	STO,CBM	217	338
P128289W	8/14/2000	44	71	24	NWSE	RIM OPERATING, INC	CBM C #33-24	GST	STO,CBM	252	380
P128290W	8/14/2000	44	71	24	SESE	RIM OPERATING, INC	CBM C #44-24	GST	STO,CBM	219	375
P128297W	8/14/2000	44	71	24	SENE	RIM OPERATING, INC	CBM C #22-24	GST	STO,CBM	255	385
P132543W	2/8/2001	44	71	24	NESW	RIM OPERATING, INC	CBM C # 23-24	GST	MON	279	365
P140145W	10/16/2001	44	71	24	NWNE	RIM OPERATING, INC.	CBM C #31-24	GST	STO,CBM	342	425
P140146W	10/16/2001	44	71	24	SENE	RIM OPERATING, INC.	CBM C #42-24	GST	STO,CBM	319	405
P2973P	12/31/1946	44	71	25	SENE	MILLS LAND & LIVESTOCK CO., INC.	MILLS #22	PUW	STO	70	90
P121839W	12/27/1999	44	71	25	NWSE	RIM OPERATING, INC	CBM C #33-25	GST	STO,CBM	193	326
P121840W	12/27/1999	44	71	25	NWNE	RIM OPERATING, INC	CBM C #31-25	GST	STO,CBM	195	328
P123657W	2/28/2000	44	71	25	NWNW	RIM OPERATING, INC	CBM C #11-25	UNA	STO,CBM	201	327
P123658W	2/28/2000	44	71	25	NWSW	RIM OPERATING, INC	CBM C #13-25	GST	STO,CBM	192	357
P123891W	3/6/2000	44	71	25	SESW	RIM OPERATING, INC	CBM C #24-25	GST	STO,CBM	214	355
P123893W	3/6/2000	44	71	25	SENE	RIM OPERATING, INC	CBM C #22-25	GST	STO,CBM	208	324
P128291W	8/14/2000	44	71	25	SENE	RIM OPERATING, INC	CBM C #42-25	GST	STO,CBM	230	350
P128292W	8/14/2000	44	71	25	SESE	RIM OPERATING, INC	CBM C #44-25	GST	STO,CBM	263	345
P121838W	12/27/1999	44	71	26	NWNE	RIM OPERATING, INC	CBM C #31-26	GST	STO,CBM	198	348
P128068W	8/4/2000	44	71	26	SESE	RIM OPERATING, INC	CBM C 44-26	GST	STO,CBM	231	385
P128069W	8/4/2000	44	71	26	SENE	RIM OPERATING, INC	CBM C 42-26	GST	STO,CBM	205	300
P128070W	8/4/2000	44	71	26	NWSE	RIM OPERATING, INC	CBM C 33-26	UNA	STO,CBM	215	405
P128293W	8/14/2000	44	71	26	NWNW	RIM OPERATING, INC	CBM C #11-26	GST	STO,CBM	233	422
P128294W	8/14/2000	44	71	26	NWSW	RIM OPERATING, INC	CBM C #13-26	GST	STO,CBM	238	437
P128295W	8/14/2000	44	71	26	SENE	RIM OPERATING, INC	CBM C #22-26	UNA	STO,CBM	219	407
P128296W	8/14/2000	44	71	26	SESW	RIM OPERATING, INC	CBM C #24-26	GST	STO,CBM	216	427
P135821W	6/15/2001	44	71	26	SESW	RIM OPERATING, INC	ENL CBM C # 24-26	GST	STO,CBM	216	427
P135822W	6/15/2001	44	71	26	NWSW	RIM OPERATING, INC	ENL CBM C # 13-26	GST	STO,CBM	238	437
P135823W	6/15/2001	44	71	26	NWNW	RIM OPERATING, INC	ENL CBM C # 11-26	GST	STO,CBM	233	422
P3215P	7/16/1930	44	71	27	SENE	W. L. FERGUSON	FERGUSON #1	PUW	DOM	16	24
P3216P	10/17/1944	44	71	27	SENE	W. L. FERGUSON	FERGUSON #2	PUW	DOM,STO	70	100
P118863W	9/1/1999	44	71	27	SWSW	LANCE OIL & GAS COMPANY, INC	CHITTENDEN 14-27	GST	CBM	250	503
P118864W	9/1/1999	44	71	27	NESW	LANCE OIL & GAS COMPANY, INC	CHITTENDEN 23-27	GST	CBM	257	523
P128584W	8/22/2000	44	71	27	SWSE	LANCE OIL & GAS COMPANY, INC	FERGUSON 34-27-4471	GST	CBM	54	501
P128585W	8/22/2000	44	71	27	NESE	LANCE OIL & GAS COMPANY, INC	FERGUSON 43-27-4471	GST	CBM	108	501
P131375W	12/4/2000	44	71	27	SWNW	DAVID D. FERGUSON, ET AL.** COLEMAN OIL & GAS, INC.	FERGUSON #12-27	GST	STO,CBM	240	571
P131376W	12/4/2000	44	71	27	NENW	DAVID D. FERGUSON, ET AL.** COLEMAN OIL & GAS, INC.	FERGUSON #21-27	GST	STO,CBM	211	527
P145783W	6/26/2002	44	71	27	SWNE	DAVID D. FERGUSON, ET AL.** COLEMAN OIL & GAS, INC.	FERGUSON #32-27	GST	STO,CBM	425	512
P145786W	6/26/2002	44	71	27	NENE	DAVID D. FERGUSON, ET AL.** COLEMAN OIL & GAS, INC.	FERGUSON #41-27	GST	STO,CBM	385	458
P118170W	8/6/1999	44	71	28	SWSW	LANCE OIL & GAS COMPANY, INC	STUART 14-28	GST	CBM	240	607
P118171W	8/6/1999	44	71	28	NESW	LANCE OIL & GAS COMPANY, INC	STUART 21-28	GST	CBM	277	582



## Supplementary Information on the Affected Environment

Table S4-4. Groundwater Rights for the West Jacobs Ranch LBA Tract (Continued).											
Permit	Priority	T	R	S	QQ	Applicant	Facility Name	Status	Uses	Static WL	T.D.
P118865W	9/1/1999	44	71	28	SWSE	LANCE OIL & GAS COMPANY, INC	CHITTENDEN 34-28	GST	CBM	265	557
P118866W	9/1/1999	44	71	28	NESE	LANCE OIL & GAS COMPANY, INC	CHITTENDEN 43-28	GST	CBM	270	542
P121902W	12/29/1999	44	71	28	SWNW	LANCE OIL & GAS COMPANY, INC	SNODGRASS 12-28-4471	GST	CBM	279	622
P121903W	12/29/1999	44	71	28	NENW	LANCE OIL & GAS COMPANY, INC	SNODGRASS 21-28-4471	GST	CBM	289	609
P121904W	12/29/1999	44	71	28	SWNE	LANCE OIL & GAS COMPANY, INC	SNODGRASS 32-28-4471	GST	CBM	277	565
P121905W	12/29/1999	44	71	28	NENE	LANCE OIL & GAS COMPANY, INC	SNODGRASS 41-28-4471	GST	CBM	292	583
P92738W	9/3/1993	44	71	29	SESE	JAMES R. AND IRENE STUART	ALICE #2	UNA	STO	40	100
P118172W	8/6/1999	44	71	29	SWSE	LANCE OIL & GAS COMPANY, INC	STUART 34-29	GST	CBM	293	683
P118173W	8/6/1999	44	71	29	NESE	LANCE OIL & GAS COMPANY, INC	STUART 43-29	GST	CBM	282	642
P121906W	12/29/1999	44	71	29	SWNW	LANCE OIL & GAS COMPANY, INC	STUART 12-29-4471	GST	CBM	329	742
P121907W	12/29/1999	44	71	29	SWSW	LANCE OIL & GAS COMPANY, INC	STUART 14-29-4471	GST	CBM	320	722
P121908W	12/29/1999	44	71	29	NENW	LANCE OIL & GAS COMPANY, INC	STUART 21-29-4471	GST	CBM	316	682
P121909W	12/29/1999	44	71	29	NESW	LANCE OIL & GAS COMPANY, INC	STUART 23-29-4471	GST	CBM	304	690
P121910W	12/29/1999	44	71	29	SWNE	LANCE OIL & GAS COMPANY, INC	STUART 32-29-4471	GST	CBM	291	642
P121911W	12/29/1999	44	71	29	NENE	LANCE OIL & GAS COMPANY, INC	STUART 41-29-4471	GST	CBM	298	662
P128459W	8/17/2000	44	71	30	NESE	LANCE OIL & GAS COMPANY, INC	STUART FEDERAL 43-30-4471	GST	CBM	611	722
P128460W	8/17/2000	44	71	30	NENE	LANCE OIL & GAS COMPANY, INC	STUART FEDERAL 41-30-4471	GST	CBM	645	784
P128461W	8/17/2000	44	71	30	SWSE	LANCE OIL & GAS COMPANY, INC	STUART FEDERAL 34-30-4471	GST	CBM	662	790
P128462W	8/17/2000	44	71	30	SWNE	LANCE OIL & GAS COMPANY, INC	STUART FEDERAL 32-30-4471	GST	CBM	700	835
P137904W	7/23/2001	44	71	30	SWSW	LANCE OIL & GAS COMPANY, INC	FEDERAL 14-30-4471	GST	CBM	714	935
P137915W	7/23/2001	44	71	30	NESW	LANCE OIL & GAS COMPANY, INC	STUART FEDERAL 23-30-4471	GST	CBM	676	795
P137919W	7/23/2001	44	71	30	SWNW	LANCE OIL & GAS COMPANY, INC	STUART FEDERAL 12-30-4471	GST	CBM	301	855
P137927W	7/23/2001	44	71	30	NENW	LANCE OIL & GAS COMPANY, INC	STUART FEDERAL 21-30-4471	GST	CBM	675	847
P81413W	12/4/1989	44	71	31	NWNE	PAUL R/RUBY H STUART	PAUL #1	UNA	STO	120	205
P106969W	8/1/1997	44	71	31	SENE	BARRETT RESOURCES CORP.	STUART FED. 42-31A	UNA	MON	253.7	580
P106970W	8/1/1997	44	71	31	SENE	BARRETT RESOURCES CORP.	STUART FED. 42-31B	UNA	MON	336.3	744
P106971W	8/1/1997	44	71	31	SENE	BARRETT RESOURCES CORP.	STUART FED. 42-31C	UNA	MON	333.8	850
P123408W	2/18/2000	44	71	31	SWSW	LANCE OIL & GAS COMPANY, INC** WY STATE BOARD OF LAND COMMISSIONERS	HAYNES 14-31-4471	GST	CBM	602	830
P128457W	8/17/2000	44	71	31	SENE	LANCE OIL & GAS COMPANY, INC	STUART FEDERAL 42-31-4471	GST	CBM	819	863
P137908W	7/23/2001	44	71	31	NESW	LANCE OIL & GAS COMPANY, INC	STUART FEDERAL 23-31-4471	GST	CBM	734	820
P137910W	7/23/2001	44	71	31	NENW	LANCE OIL & GAS COMPANY, INC	HAYNES FEDERAL 21-31-4471	GST	CBM	817	975
P137912W	7/23/2001	44	71	31	SWNW	LANCE OIL & GAS COMPANY, INC	HAYNES FEDERAL 12-31-4471	GST	CBM	819	863
P141956W	1/4/2002	44	71	31	NWNE	LANCE OIL & GAS COMPANY, INC	STUART FEDERAL 31-31-4471	GST	CBM	837	902
P118174W	8/6/1999	44	71	32	SWNE	LANCE OIL & GAS COMPANY, INC	STUART 32-32	GST	CBM	287	640
P118175W	8/6/1999	44	71	32	NENE	LANCE OIL & GAS COMPANY, INC	STUART 41-32	GST	CBM	285	622
P118184W	8/6/1999	44	71	32	SWSW	LANCE OIL & GAS COMPANY, INC	FLOCCHINI 14-32	GST	CBM	328	730
P118185W	8/6/1999	44	71	32	NESW	LANCE OIL & GAS COMPANY, INC	FLOCCHINI 23-32	GST	CBM	313	695

Table S4-4. Groundwater Rights for the West Jacobs Ranch LBA Tract (Continued).

Permit	Priority	T	R	S	QQ	Applicant	Facility Name	Status	Uses	Static WL	T.D.
P118186W	8/6/1999	44	71	32	SWSE	LANCE OIL & GAS COMPANY, INC	FLOCCHINI 34-32	GST	CBM	283	652
P118187W	8/6/1999	44	71	32	NESE	LANCE OIL & GAS COMPANY, INC	FLOCCHINI 43-32	GST	CBM	274	620
P118868W	9/1/1999	44	71	32	SWNW	LANCE OIL & GAS COMPANY, INC	STUART 12-32	GST	CBM	342	710
P118869W	9/1/1999	44	71	32	NENW	LANCE OIL & GAS COMPANY, INC	STUART 21-32	GST	CBM	291	692
P118176W	8/6/1999	44	71	33	SWNW	LANCE OIL & GAS COMPANY, INC	STUART 12-33	GST	CBM	272	620
P118177W	8/6/1999	44	71	33	SWSW	LANCE OIL & GAS COMPANY, INC	STUART 14-33	GST	CBM	265	577
P118178W	8/6/1999	44	71	33	NENW	LANCE OIL & GAS COMPANY, INC	STUART 21-33	GST	CBM	292	610
P118179W	8/6/1999	44	71	33	NESW	LANCE OIL & GAS COMPANY, INC	STUART 23-33	GST	CBM	260	579
P118180W	8/6/1999	44	71	33	SWNE	LANCE OIL & GAS COMPANY, INC	STUART 32-33	GST	CBM	266	560
P118181W	8/6/1999	44	71	33	SWSE	LANCE OIL & GAS COMPANY, INC	STUART 34-33	GST	CBM		
P118182W	8/6/1999	44	71	33	NENE	LANCE OIL & GAS COMPANY, INC	STUART 41-33	GST	CBM		
P5971W	5/29/1970	44	71	34	NESE	INC. STUART BROTHERS	SWP #1	GST	STO		
P5972W	5/29/1970	44	71	34	NESE	INC. STUART BROTHERS	SWP #2	PUW	STO		
P92345W	7/20/1993	44	71	34	SWSE	JAMES R. AND IRENE STUART	ALICE #1	UNA	DOM		
P128453W	8/17/2000	44	71	34	NESW	LANCE OIL & GAS COMPANY, INC	STUART FEDERAL 23-34-4471	GST	CBM		
P128454W	8/17/2000	44	71	34	NENW	LANCE OIL & GAS COMPANY, INC	STUART FEDERAL 21-34-4471	GST	CBM	446	495
P128455W	8/17/2000	44	71	34	SWSW	LANCE OIL & GAS COMPANY, INC	STUART FEDERAL 14-34-4471	GST	CBM	469	501
P128456W	8/17/2000	44	71	34	SWNW	LANCE OIL & GAS COMPANY, INC	STUART FEDERAL 12-34-4471	GST	CBM	488	518
P136616W	7/2/2001	44	71	34	NESE	LANCE OIL & GAS COMPANY, INC	STUART FEDERAL 43-34-4471	GST	CBM	425	443
P136617W	7/2/2001	44	71	34	SWSE	LANCE OIL & GAS COMPANY, INC	STUART FEDERAL 34-34-4471	GST	CBM	454	480
P145784W	6/26/2002	44	71	34	SWNE	DAVID D. FERGUSON, ET AL.** COLEMAN OIL & GAS, INC.	FERGUSON #32-34	GST	CBM	455	495
P145787W	6/26/2002	44	71	34	NENE	DAVID D. FERGUSON, ET AL.** COLEMAN OIL & GAS, INC.	FERGUSON #41-34	GST	CBM	422	446
P19250P	12/31/1961	44	71	35	SENE	ARK LAND COMPANY	REVLAND #5	UNA	DOM,STO	-1	125
P30419W	7/16/1975	44	71	35	NENE	ARK LAND COMPANY	REVLAND #1	UNA	DOM,STO	150	303
P128066W	8/4/2000	44	71	35	SENE	RIM OPERATING, INC	CBM C 42-35	GST	STO,CBM	238	425
P128067W	8/4/2000	44	71	35	NWNE	RIM OPERATING, INC	CBM C 31-35	GST	STO,CBM	201	405
P143825W	4/2/2002	44	71	35	NWNE	RIM OPERATING, INC	ENL. CBM C #31-35	GST	STO,CBM	201	405
P146103W	7/19/2002	44	71	35	NWNW	RIM OPERATING, INC.	CBM C # 11-35	GSE	STO,CBM		
P146104W	7/19/2002	44	71	35	SENE	RIM OPERATING, INC.	CBM C # 22-35	GSE	STO,CBM		
P33644W	6/2/1976	44	71	36	NENE	WYO BOARD OF LAND COMMISSIONERS** THUNDER BASIN COAL CO., LLC	ECH 6	UNA	MON	170	395
P121835W	12/27/1999	44	71	36	NWNE	RIM OPERATING, INC	CBM C #31-36	UNA	STO,CBM	170	296
P121844W	12/27/1999	44	71	36	NWSE	RIM OPERATING, INC** WY STATE BOARD OF LAND COMMISSIONERS	CBM C #33-36	GST	STO,CBM	152	282
P121845W	12/27/1999	44	71	36	NWSW	RIM OPERATING, INC** WY STATE BOARD OF LAND COMMISSIONERS	CBM C #13-36	GST	STO,CBM	198	386
P121846W	12/27/1999	44	71	36	NWNW	RIM OPERATING, INC** WY STATE BOARD OF LAND COMMISSIONERS	CBM C #11-36	GST	STO,CBM	168	337
P125924W	5/25/2000	44	71	36	SENE	RIM OPERATING, INC** WY STATE BOARD OF LAND COMMISSIONERS	CBM C #42-36	GST	STO,CBM	154	262
P125925W	5/25/2000	44	71	36	SENE	RIM OPERATING, INC** WY STATE BOARD OF LAND COMMISSIONERS	CBM C #22-36	UNA	STO,CBM	189	355
P125926W	5/25/2000	44	71	36	SESW	RIM OPERATING, INC** WY STATE BOARD OF LAND COMMISSIONERS	CBM C #24-36	GST	STO,CBM	183	390
P128065W	8/4/2000	44	71	36	SESE	WY STATE BOARD OF LAND COMMISSIONERS** RIM OPERATING, INC	CBM C 44-36	GST	STO,CBM	155	313

## Supplementary Information on the Affected Environment

**Table S4-4. Groundwater Rights for the West Jacobs Ranch LBA Tract (Continued).**

Permit	Priority	T	R	S	QQ	Applicant	Facility Name	Status	Uses	Static WL	T.D.
P170784W	10/28/2005	44	71	36	NESE	JACOBS RANCH COAL CO.** WY STATE BOARD OF LAND COMMISSIONERS	TW-36SE1	GSI	TST		
P170785W	10/28/2005	44	71	36	NESE	JACOBS RANCH COAL CO.** WY STATE BOARD OF LAND COMMISSIONERS	TW-36SE2	GSI	TST		
P170786W	10/28/2005	44	71	36	NENW	JACOBS RANCH COAL CO.** WY STATE BOARD OF LAND COMMISSIONERS	TW-36NW1	GSI	TST		
P170787W	10/28/2005	44	71	36	NENW	JACOBS RANCH COAL CO.** WY STATE BOARD OF LAND COMMISSIONERS	TW-36NW2	GSI	TST		
P178325W	10/4/2006	44	71	36	SENE	JACOBS RANCH COAL COMPANY** WY STATE BOARD OF LAND COMMISSIONERS	DW 2006-20	UNA	MIS		
P178328W	10/4/2006	44	71	36	NENE	JACOBS RANCH COAL COMPANY** WY STATE BOARD OF LAND COMMISSIONERS	DW 2006-11,12	UNA	MIS		
P112049W	10/6/1998	44	72	11	SESE	BARRETT RESOURCES CORP.	WEST FORK FLOCCHINI 44-11	GSE	CBM		
P137950W	7/23/2001	44	72	11	SWSE	LANCE OIL & GAS COMPANY, INC	DURHAM RANCH FEDERAL 34-11-4472	GST	CBM	679	834
P147612W	10/4/2002	44	72	11	SESE	LANCE OIL & GAS COMPANY, INC	WEST FORK FLOCCHINI 44-11-4472	GST	CBM	661	861
P108076W	11/6/1997	44	72	12	NWNE	LANCE OIL & GAS COMPANY, INC	DURHAM RANCH FED 1-31-12	GST	CBM,MIS	349	824
P112048W	10/6/1998	44	72	12	NESE	LANCE OIL & GAS COMPANY, INC	WEST FORK FLOCCHINI 43-12	GST	CBM	353	879
P115200W	4/16/1999	44	72	12	NWNE	BARRETT RESOURCES CORP	ENL DURHAM RANCH RED 1-31-12	GST	CBM	349	824
P122990W	1/19/2000	44	72	12	NENE	WILLIAMS PRODUCTION RMT, COMPANY	BEAVERS TRUST FED. 41-12-4472	GSI	CBM		
P122991W	1/19/2000	44	72	12	SWNW	WILLIAMS PRODUCTION RMT, COMPANY	EAST FORK FED. 12-12	GSI	CBM		
P122993W	1/19/2000	44	72	12	SWSW	WILLIAMS PRODUCTION RMT, COMPANY	DURHAM RANCH FED. 14-12-4472	GSI	CBM		
P122994W	1/19/2000	44	72	12	NESW	WILLIAMS PRODUCTION RMT, COMPANY	DURHAM RANCH FED. 23-12-4472	GST	CBM	685	982
P137951W	7/23/2001	44	72	12	SWNW	WILLIAMS PRODUCTION RMT, COMPANY	EAST FORK FEDERAL 12-12	GST	CBM	733	800
P137953W	7/23/2001	44	72	12	NENE	LANCE OIL & GAS COMPANY, INC	BEAVERS TRUST FEDERAL 41-12-4472	GST	CBM	733	798
P137955W	7/23/2001	44	72	12	SWSW	LANCE OIL & GAS COMPANY, INC	DURHAM RANCH FEDERAL 14-12-4472	GST	CBM	822	922
P137959W	7/23/2001	44	72	12	SWSE	LANCE OIL & GAS COMPANY, INC	DURHAM RANCH FEDERAL 34-12-4472	GST	CBM	822	984
P137956W	7/23/2001	44	72	13	NESW	LANCE OIL & GAS COMPANY, INC	DURHAM RANCH FEDERAL 23-13-4472	GST	CBM	924	1010
P137958W	7/23/2001	44	72	13	SWSW	LANCE OIL & GAS COMPANY, INC	DURHAM RANCH FEDERAL 14-13-4472	GST	CBM	611	844
P137960W	7/23/2001	44	72	13	SWNW	LANCE OIL & GAS COMPANY, INC	DURHAM RANCH FEDERAL 12-13-4472	GST	CBM	707	874
P137973W	7/23/2001	44	72	13	SWNE	LANCE OIL & GAS COMPANY, INC	EAST FORK FEDERAL 32-13	GST	CBM	779	983
P137975W	7/23/2001	44	72	13	SWSE	LANCE OIL & GAS COMPANY, INC	EAST FORK FEDERAL 34-13	GST	CBM	767	850
P137977W	7/23/2001	44	72	13	NENE	LANCE OIL & GAS COMPANY, INC	EAST FORK FEDERAL 41-13	GST	CBM	840	963
P137978W	7/23/2001	44	72	13	NESE	LANCE OIL & GAS COMPANY, INC	EAST FORK FEDERAL 43-13	GST	CBM	795	860
P137980W	7/23/2001	44	72	13	NENW	LANCE OIL & GAS COMPANY, INC	EAST FORK FEDERAL 21-13	GST	CBM	754	1007

**Table S4-4. Groundwater Rights for the West Jacobs Ranch LBA Tract (Continued).**

<b>Permit</b>	<b>Priority</b>	<b>T</b>	<b>R</b>	<b>S</b>	<b>QQ</b>	<b>Applicant</b>	<b>Facility Name</b>	<b>Status</b>	<b>Uses</b>	<b>Static WL</b>	<b>T.D.</b>
P13287P	12/31/1945	44	72	14	SWNE	DURHAM MEAT CO.	DURHAM MEAT #34	PUW	STO	31	86
P106973W	8/1/1997	44	72	14	NESE	BARRETT RESOURCES CORP.	DURHAM RANCH FED. 43-14B	UNA	MON	275	820
P135700W	6/11/2001	44	72	14	NENE	LANCE OIL & GAS COMPANY, INC	DURHAM RANCH 41-14-4472	GST	CBM	692	926
P135701W	6/11/2001	44	72	14	SWSW	LANCE OIL & GAS COMPANY, INC	DURHAM RANCH 14-14-4472	GST	CBM	808	900
P137877W	7/23/2001	44	72	14	SWNW	LANCE OIL & GAS COMPANY, INC	DURHAM RANCH FEDERAL 12-14-4472	GST	CBM	839	935
P137878W	7/23/2001	44	72	14	NENW	LANCE OIL & GAS COMPANY, INC	DURHAM RANCH FEDERAL 21-14-4472	GST	CBM	738	901
P137962W	7/23/2001	44	72	14	NESW	LANCE OIL & GAS COMPANY, INC	DURHAM RANCH FEDERAL 23-14-4472	GST	CBM	784	865
P137963W	7/23/2001	44	72	14	SWNE	LANCE OIL & GAS COMPANY, INC	DURHAM RANCH FEDERAL 32-14-4472	GST	CBM	757	826
P149834W	2/20/2003	44	72	14	NESE	LANCE OIL & GAS COMPANY, INC	DURHAM RANCH FEDERAL 43-14-4472	GST	CBM	782	840
P123987W	3/13/2000	44	72	15	SESE	LANCE OIL & GAS COMPANY, INC	DURHAM RANCH 44-15-4472	GST	CBM	525	864
P137885W	7/23/2001	44	72	22	NENE	LANCE OIL & GAS COMPANY, INC	DURHAM RANCH FEDERAL 41-22-4472	GST	CBM	765	888
P137886W	7/23/2001	44	72	22	NESE	LANCE OIL & GAS COMPANY, INC	DURHAM RANCH FEDERAL 43-22-4472	GST	CBM	856	984
P2723W	7/8/1969	44	72	23	SESW	LESTER R. WRIGHT	JUNCTION #1	PUW	DOM	50	242
P33797W	5/18/1976	44	72	23	SWSE	SON-R INC.	SON R #1	PUW	IND		
P101217W	1/8/1996	44	72	23	SESE	PAUL R/RUBY H STUART	NORTH WRIGHT #1	UNA	STO	84	110
P123016W	1/19/2000	44	72	23	SWNE	LANCE OIL & GAS COMPANY, INC	DURHAM RANCH 32-23-4472	GST	CBM	767	992
P123984W	3/13/2000	44	72	23	NWSE	LANCE OIL & GAS COMPANY, INC	DURHAM RANCH 33-23-4472	GST	CBM	740	938
P137881W	7/23/2001	44	72	23	SWSW	LANCE OIL & GAS COMPANY, INC	DURHAM RANCH FEDERAL 14-23-4472	GST	CBM	805	976
P137887W	7/23/2001	44	72	23	SWNW	LANCE OIL & GAS COMPANY, INC	DURHAM RANCH FEDERAL 12-23-4472	GST	CBM	879	970
P137965W	7/23/2001	44	72	23	NENW	LANCE OIL & GAS COMPANY, INC	DURHAM RANCH FEDERAL 21-23-4472	GST	CBM	991	150
P137967W	7/23/2001	44	72	23	NESW	LANCE OIL & GAS COMPANY, INC	SUNRISE FEDERAL 23-23-4472	GST	CBM	859	1027
P144542W	5/14/2002	44	72	23	NESW	SUNRISE ENTERPRISES	SUNRISE # 1	GST	MIS	470	1329
P145287W	5/29/2002	44	72	23	NENE	WILLIAMS PRODUCTION RMT COMPANY	FLOCCHINI 41-23	GST	CBM	804	895
P145288W	5/29/2002	44	72	23	NESE	WILLIAMS PRODUCTION RMT COMPANY	FLOCCHINI 43-23	GST	CBM	752	866
P152559W	6/11/2003	44	72	23	NESE	LANCE OIL & GAS COMPANY, INC	FLOCCHINI 43-23-4472	GST	STO,CBM	752	875
P152560W	6/11/2003	44	72	23	NENE	LANCE OIL & GAS COMPANY, INC	FLOCCHINI 41-23-4472	GST	STO,CBM	804	903
P13288P	12/31/1944	44	72	24	NWNE	DURHAM MEAT CO.	DURHAM MEAT #35	PUW	STO	43	88
P108077W	11/6/1997	44	72	24	NENW	LANCE OIL & GAS COMPANY, INC	DURHAM RANCH FED 1-21-24	GST	CBM	301	832
P114639W	3/18/1999	44	72	24	NENW	BARRETT RESOURCES CORPORATION	ENL DURHAM RANCH FED 1-21-24	GST	CBM	300	832
P133186W	3/2/2001	44	72	24	SWSW	LANCE OIL & GAS COMPANY, INC	STUART 14-24-4472	GST	CBM	689	854
P133187W	3/2/2001	44	72	24	SWNE	LANCE OIL & GAS COMPANY, INC	DURHAM RANCH 32-24-4472	GST	CBM	748	842
P133188W	3/2/2001	44	72	24	SWSE	LANCE OIL & GAS COMPANY, INC	DURHAM RANCH 34-24-4472	GST	CBM	778	900
P133189W	3/2/2001	44	72	24	NENE	LANCE OIL & GAS COMPANY, INC	DURHAM RANCH 41-24-4472	GST	CBM	768	838

## Supplementary Information on the Affected Environment

Table S4-4. Groundwater Rights for the West Jacobs Ranch LBA Tract (Continued).											
Permit	Priority	T	R	S	QQ	Applicant	Facility Name	Status	Uses	Static WL	T.D.
P137970W	7/23/2001	44	72	24	SWNW	LANCE OIL & GAS COMPANY, INC	DURHAM RANCH FEDERAL 12-24-4472	GST	CBM	689	843
P137982W	7/23/2001	44	72	24	NESW	LANCE OIL & GAS COMPANY, INC	DURHAM RANCH FEDERAL 23-24-4472	GST	CBM	724	834
P137954W	7/23/2001	44	72	25	SWSW	LANCE OIL & GAS COMPANY, INC	STUART FEDERAL 14- 25-4472	GST	CBM	845	934
P137971W	7/23/2001	44	72	25	NESW	LANCE OIL & GAS COMPANY, INC	STUART FEDERAL 23- 25-4472	GST	CBM	804	872
P137972W	7/23/2001	44	72	25	SWSE	LANCE OIL & GAS COMPANY, INC	STUART FEDERAL 34- 25-4472	GST	CBM	792	906
P137974W	7/23/2001	44	72	25	NESE	LANCE OIL & GAS COMPANY, INC	STUART FEDERAL 43- 25-4472	GST	CBM	776	990
P137976W	7/23/2001	44	72	25	SWNW	LANCE OIL & GAS COMPANY, INC	STUART FEDERAL 12- 25-4472	GST	CBM	632	866
P137979W	7/23/2001	44	72	25	NENW	LANCE OIL & GAS COMPANY, INC	STUART FEDERAL 21- 25-4472	GST	CBM	807	916
P137981W	7/23/2001	44	72	25	SWNE	LANCE OIL & GAS COMPANY, INC	STUART FEDERAL 32- 25-4472	GST	CBM	918	1017
P137983W	7/23/2001	44	72	25	NENE	LANCE OIL & GAS COMPANY, INC	STUART FEDERAL 41- 25-4472	GST	CBM	814	905
P32148W	2/17/1976	44	72	26	SENW	DALE L. WRIGHT	NOLENE #1	PUW	DOM	460	894
P48090W	4/5/1979	44	72	26	SWNW	WRIGHT WATER AND SEWER DISTRICT	RJ 4	PUW	MIS,MUN		
P48493W	6/5/1979	44	72	26	SENW	INC. THE RIGHT LIQUOR STORE	THE RIGHT LIQUOR STORE #1	PUW	MIS	290	800
P71834W	2/4/1986	44	72	26	SWNW	WRIGHT WATER AND SEWER DISTRICT	RJ 4	ADJ	MUN	427	3015
P101358W	6/14/1995	44	72	26	SWNW	WRIGHT WATER AND SEWER DISTRICT	ENL RJ-4 WELL	UNA	MUN	427	3015
P124993W	4/10/2000	44	72	26	SWNW	WRIGHT WATER & SEWER DISTRICT	ENL RJ-4 WELL	UNA	MUN	427	3015
P137964W	7/23/2001	44	72	26	NENE	LANCE OIL & GAS COMPANY, INC	STUART FEDERAL 41- 26-4472	GST	CBM	786	935
P137966W	7/23/2001	44	72	26	NESE	LANCE OIL & GAS COMPANY, INC	STUART FEDERAL 43- 26-4472	GST	CBM	851	943
P137984W	7/23/2001	44	72	26	SWNE	LANCE OIL & GAS COMPANY, INC	STUART FEDERAL 32- 26-4472	GST	CBM	807	858
P137985W	7/23/2001	44	72	26	SWSE	LANCE OIL & GAS COMPANY, INC	STUART FEDERAL 34- 26-4472	GST	CBM	692	1000
P29417W	3/7/1975	44	72	27	SESE	ATLANTIC RICHFIELD COMPANY	RENO #2	PUW	MUN		
P37539W	2/2/1977	44	72	35	SENW	ATLANTIC RICHFIELD COMPANY	RJ-3	PUW	MIS,MUN		
P46696W	2/9/1979	44	72	35	SENW	WRIGHT WATER AND SEWER DISTRICT	RJ 3	ADJ	MUN	428.8	2730
P67592W	12/6/1983	44	72	35	NESW	VAN C. AND OR DIANNA L. HOLSCHER	HOLSCHER #1	PUW	MIS		
P71147W	9/16/1985	44	72	35	SWSW	CHARLES TYRREL	LITTLE THUNDER #1	PUW	DOM	630	700
P80562W	8/30/1990	44	72	35	SWSW	CHARLES T. TYRREL**RANDY REEVES	TR #1	UNA	DOM	415	660
P101357W	6/14/1995	44	72	35	SENW	WRIGHT WATER AND SEWER DISTRICT	ENL RJ-3 WELL	UNA	MUN	428.8	2730
P124992W	4/10/2000	44	72	35	SENW	WRIGHT WATER & SEWER DISTRICT	ENL RJ-3 WELL	UNA	MUN	428	2730
P137871W	7/23/2001	44	72	35	SWSE	LANCE OIL & GAS COMPANY, INC	STUART FEDERAL 34- 35-4472	GST	CBM	46.2	955
P137872W	7/23/2001	44	72	35	NESE	LANCE OIL & GAS COMPANY, INC	STUART FEDERAL 43- 35-4472	GST	CBM	51	1069
P145604W	7/1/2002	44	72	35	SWNE	WDEQ/WQD	MW1354	GST	MON	15	20
P101216W	1/8/1996	44	72	36	SESE	WYO BOARD OF LAND COMMISSIONERS**PAUL R/RUBY H STUART	NORTH SCHOOL WELL #1	UNA	STO	70	141
P123400W	2/18/2000	44	72	36	SWNW	LANCE OIL & GAS COMPANY, INC** WY STATE BOARD OF LAND COMMISSIONERS	STATE 12-36-4472	GST	CBM	683	996
P123401W	2/18/2000	44	72	36	SWSW	LANCE OIL & GAS COMPANY, INC** WY STATE BOARD OF LAND COMMISSIONERS	STATE 14-36-4472	GST	CBM	678	1023

**Table S4-4. Groundwater Rights for the West Jacobs Ranch LBA Tract (Continued).**

<b>Permit</b>	<b>Priority</b>	<b>T</b>	<b>R</b>	<b>S</b>	<b>QQ</b>	<b>Applicant</b>	<b>Facility Name</b>	<b>Status</b>	<b>Uses</b>	<b>Static WL</b>	<b>T.D.</b>
P123402W	2/18/2000	44	72	36	NENW	LANCE OIL & GAS COMPANY, INC** WY STATE BOARD OF LAND COMMISSIONERS	STATE 21-36-4472	GST	CBM	631	934
P123403W	2/18/2000	44	72	36	NESW	LANCE OIL & GAS COMPANY, INC** WY STATE BOARD OF LAND COMMISSIONERS	STATE 23-36-4472	GST	CBM	604	967
P123404W	2/18/2000	44	72	36	SWNE	LANCE OIL & GAS COMPANY, INC** WY STATE BOARD OF LAND COMMISSIONERS	STATE 32-36-4472	GST	CBM	633	987
P123405W	2/18/2000	44	72	36	SWSE	WY STATE BOARD OF LAND COMMISSIONERS** LANCE OIL & GAS COMPANY, INC	STATE 34-36-4472	GST	CBM	615	962
P123406W	2/18/2000	44	72	36	NENE	WY STATE BOARD OF LAND COMMISSIONERS** LANCE OIL & GAS COMPANY, INC	STATE 41-36-4472	GST	CBM	597	923
P123407W	2/18/2000	44	72	36	NESE	LANCE OIL & GAS COMPANY, INC** WY STATE BOARD OF LAND COMMISSIONERS	STATE 43-36-4472	GST	CBM	559	921
P117311W	6/28/1999	45	71	32	SWSE	LANCE OIL/GAS COMPANY, INC.	BOLLER MILLS FED 34-32-4571		STO,CBM		
P138723W	8/20/2001	45	71	32	SWSE	LANCE OIL/GAS COMPANY, INC.	BOLLER-MILLS FED 34-32-4571	GST	STO,CBM	531.5	764
P138727W	8/20/2001	45	71	32	SWSE	LANCE OIL/GAS COMPANY, INC.	DURHAM RANCH FED 34-19-4571	GST	STO,CBM	443.3	620
P148380W	11/8/2002	45	71	33	NESW	RIM OPERATING, INC.	CBM B #23-33	GST	STO,MIS,CBM	412	705
P148381W	11/8/2002	45	71	33	SWSE	RIM OPERATING, INC.	CBM B #34-33	GST	STO,MIS,CBM	383	585
P155326W	10/20/2003	45	71	33	SWSW	RIM OPERATING, INC.	CBM B #14-33	GST	CBM,MIS	585	750
P155327W	10/20/2003	45	71	33	NESE	RIM OPERATING, INC.	CBM B #43-33	GST	CBM,MIS	359	570
P143428W	3/25/2002	45	71	34	SESE	BOLLER/MILLS RANCH	BIG SHED WELL	GST	STO	20.63	80
P146875W	8/21/2002	45	71	34	NWSE	RIM OPERATING, INC.	CBM B # 33-34	GST	STO,CBM	296	465
P146876W	8/21/2002	45	71	34	SESE	RIM OPERATING, INC.	CBM B # 44-34	GST	STO,CBM	293	445
P160990W	1/7/2004	45	71	34	SESW	RIM OPERATING, INC.	CBM B #24-34	GST	STO,CBM	359	628
P2601W	6/12/1969	45	71	35	SWSW	JOHN E. JACOBS	ISENBERGER #3	PUW	STO	110	155
P2962P	12/21/1952	45	71	35	SWSE	MILLS LAND & LIVESTOCK CO., INC.	MILLS #11	PUW	STO	90	150
P62470W	11/3/1982	45	71	35	SESW	BUTCH REYNOLDS	REYNOLDS #1	PUW	DOM,STO	80	203
P140140W	10/16/2001	45	71	35	NWSW	RIM OPERATING, INC.	CBM B #13-35	GST	STO,CBM	259	425
P140141W	10/16/2001	45	71	35	NWSE	RIM OPERATING, INC.	CBM B #33-35	GST	STO,CBM	235	345
P2963P	10/6/1963	45	71	36	SESE	MILLS LAND & LIVESTOCK CO., INC.**WYO BOARD OF LAND COMMISSIONERS	MILLS #12	UNA	STO	42	110
P33643W	6/2/1976	45	71	36	SESE	THUNDER BASIN COAL COMPANY**WYO BOARD OF LAND COMMISSIONERS	ECH 5	UNA	MON	194	232
CR1/387A	3/1/1943	43	71	3	NESW	E. E. STUART	STUART RESERVOIR	PUO	STO	DRY FORK LITTLE THUNDER	
P1163S	3/3/1955	43	71	3	NWNW	E. E. STUART ESTATE	ALVIN PIT #1 STOCK RESERVOIR		STO	PETTERS BASIN	
P5501R	3/1/1943	43	71	3	NESW	E.E. STUART	STUART RESERVOIR	ADJ	STO	DRY FORK LITTLE THUNDER	
P1165S	3/3/1955	43	71	4	NWNW	E. E. STUART ESTATE	SPRINGEN PIT #1 STOCK RESERVOIR	PUO	STO	SPRINGEN DRAW	
P5723S	10/10/1966	43	71	4	NWNW	STUART BROTHERS INC.	HAUMAN STOCK RESERVOIR	PUO	STO	HAUMAN DRAW	

## Supplementary Information on the Affected Environment

Table S4-5. Surface Water Rights for the West Jacobs Ranch LBA Tract.										
Permit	Priority	T	R	S	QQ	Applicant	Facility Name	Status	Uses	Source
33/4/110S	9/26/2005	43	71	5		JAMES R. & IRENE STUART TRUSTS	STUART 44-05-4371 STOCK RESERVOIR	UNA	STO	DRY FORK LITTLE THUNDER CREEK
P17378S	9/26/2005	43	71	6		PAUL R. STUART REVOCABLE TRUST	STUART 41-06-4371 STOCK RESERVOIR	UNA	STO	DRY FORK LITTLE THUNDER CREEK
P1164S	3/3/1955	43	71	9	SESE	E. E. STUART ESTATE	MANOR PIT #1 STOCK RESERVOIR	PUO	STO	MANOR DRAW
CR4/254A	2/27/1967	43	71	10	SENE	USDA, FOREST SERVICE	STUART #F.S.9-256-3 STOCK RESERVOIR	PUO	STO	ERICKSON DRAW
P2343S	8/4/1958	43	71	10	SWSW	PAUL AND RUBY H. STUART	SCHROYER STOCK RESERVOIR	PUO	STO	SCHROYER DRAW
P5938S	2/27/1967	43	71	10	SENE	USDA FOREST SERVICE	STUART #F.S.9-256-3 STOCK RESERVOIR	ADJ	STO	ERICKSON DRAW
P5724S	10/10/1966	43	71	11	SESE	HAROLD E. ZIMMER	ZIMMER STOCK RESERVOIR	UNA	STO	ZIMMER DRAW
CU1/173A	6/22/1970	43	71	12	SWNE	RENO LIVESTOCK CORPORATION	HEARTSPEAR 12	PUW	COM,STO	
C42/270A	1/4/1917	43	71	17	SESE	FLORENCE B. ELEXANDER	FLORENCE RESERVOIR	PUO	STO	
P3402R	1/4/1917	43	71	17	SESE	MARION C. ELEXANDER	FLORENCE RESERVOIR	PUO	STO	NORTH PRONG LITTLE THUNDER CREEK
P17441S	9/26/2005	43	71	18	SWNW	THOMAS W. & LEAH B. EDWARDS	EDWARDS 12-18-4371 STOCK RESERVOIR	UNA	STO	LITTLE THUNDER CREEK
P10084S	2/9/1987	43	71	19		USA USDA FOREST SERVICE	RENO #9-239-1 STOCK RESERVOIR	UNA	STO	RENO DRAW
P10085S	2/9/1987	43	71	20		USA USDA FOREST SERVICE	RENO #9-239-2 STOCK RESERVOIR	GST	STO	SAGER DRAW
CR2/455A	3/31/1938	43	71	22	NWNW	USDA, FOREST SERVICE	THUNDER BASIN NO. 10 RESERVOIR	PUO	STO	
P4843R	3/31/1938	43	71	22	NWNW	USDA FOREST SERVICE	THUNDER BASIN NO. 10 RESERVOIR	ADJ	STO	LITTLE THUNDER CREEK
P33347D	11/2/2005	43	71	22	NESE	E.H. OFTEDAL & SONS, INC.	LITTLE THUNDER CREEK WATER HAUL	UNA	IND, TEM	LITTLE THUNDER CREEK
P1167S	3/3/1955	43	72	1	SESE	E. E. STUART ESTATE	WARD #1 STOCK RESERVOIR	PUO	STO	WARD DRAW
P1379S	2/6/1956	43	72	1	SWNW	E. E. STUART	MCGEE #1 STOCK RESERVOIR	PUO	STO	MCGEE DRAW
P17370S	9/26/2005	43	72	1	SWSE	PAUL R. STUART REVOCABLE TRUST	STUART 34-01-4372 STOCK RESERVOIR	UNA	STO	WARD DRAW
P16677S	9/23/2004	43	72	2		PAUL STUART	STUART #1 STOCK RESERVOIR	UNA	STO	RENO DRAW
CU6/172A	7/31/1959	43	72	11	SENW	WYOMING STATE HIGHWAY COMMISSION	RENO CAMP #1	PUW	DOM	
CU6/173A	6/16/1981	43	72	11	SENW	WYOMING STATE HIGHWAY COMMISSION	ENL RENO CAMP #1	PUW	MIS	
P1574R	7/14/1909	43	72	11	NWNE	BURTON L. RENO	RENO GULCH RESERVOIR	PUO	STO,IRR	LITTLE THUNDER CREEK
P9165D	7/6/1909	43	72	11	NWNE	BERTON L. RENO	RENO GULCH DITCH NO. ONE	PUD	STO,IRR	NAMING ERRORS
P9166D	7/6/1909	43	72	11	NWNE	BURTON L. RENO	RENO GULCH DITCH NO. 2	PUD	STO,IRR	NAMING ERRORS
P17371S	9/26/2005	43	72	12	NWSW	PAUL R. STUART REVOCABLE TRUST	STUART 13-12-4372 STOCK RESERVOIR	UNA	STO	LITTLE THUNDER CREEK
P17372S	9/26/2005	43	72	12	SENW	PAUL R. STUART REVOCABLE TRUST	STUART 22-12-4372 A STOCK RESERVOIR	UNA	STO	STUART DRAW
P17440S	9/26/2005	43	72	12	SWSE	THOMAS W. & LEAH B. EDWARDS	EDWARDS 34-12-4372 STOCK RESERVOIR	UNA	STO	LITTLE THUNDER CREEK
P2347S	8/6/1958	43	72	14	SENE	CHELMER WILMOT	CARLSON STOCK RESERVOIR	PUO	STO	WILMOT DRAW
P17084S	9/15/2004	43	72	14	SWNW	LAWRENCE D. CARLSON**BARBARA A. TUNKS	CARLSON #1 STOCK RESERVOIR	UNA	STO	BEFUDDLEMENT DRAW
CR4/255A	5/6/1966	43	72	23	NESE	USDA, FOREST SERVICE	WILMOT #F.S.9-266-4 STOCK RESERVOIR	PUO	STO	NICHOLSON DRAW
CR4/257A	2/27/1967	43	72	23	NWNE	USDA, FOREST SERVICE	WILMOT #F.S.9-266-6 STOCK RESERVOIR	PUO	STO	BRANAMAN DRAW

<b>Table S4-5. Surface Water Rights for the West Jacobs Ranch LBA Tract (Continued).</b>										
<b>Permit</b>	<b>Date</b>	<b>T</b>	<b>R</b>	<b>S</b>	<b>QQ</b>	<b>Applicant</b>	<b>Facility Name</b>	<b>Status</b>	<b>Uses</b>	<b>Source</b>
P5937S	2/27/1967	43	72	23		USDA FOREST SERVICE	WILMOT #F.S.9-266-6 STOCK RESERVOIR	ADJ	STO	BRANAMAN DRAW
P2348S	8/6/1958	43	72	24	SWSW	CHELMER WILMOT	NICHOLSON STOCK RESERVOIR	PUO	STO	QUICKSAND DRAW
CU2/294A	10/27/1971	44	70	7	NWNW	INEXCO OIL COMPANY	CENTRAL WSW #5 2	PUW	IND	
P414S	10/7/1953	44	70	30	SWNE	RALPH E. MILLS	MILLS #1 STOCK RESERVOIR	UNA	STO	MILLS #1 DRAW (17-43-70)
P415S	10/7/1953	44	70	30	SESE	RALPH E MILLS	MILLS #2 STOCK RESERVOIR	UNA	STO	MILLS #2 DRAW
P416S	10/7/1953	44	70	31	SWNE	RALPH E. MILLS	JOHNSON NO. 1 STOCK RESERVOIR	UNA	STO	MILLS #1 DRAW (17-43-70)
P417S	10/7/1953	44	70	31	NESE	RALPH E.MILLS	LONE TREE STOCK RESERVOIR	UNA	STO	MILLS #1 DRAW (17-43-70)
P418S	10/7/1953	44	70	31	SWSE	RALPH E MILLS	CROOKED STOCK RESERVOIR	UNA	STO	MILLS #1 DRAW (17-43-70)
P4894S	12/22/1964	44	71	3	NWNW	H.T. ISENBERGER	TADPOLE STOCK RESERVOIR	UNA	STO	BULL FROG DRAW
P17505S	10/28/2005	44	71	4	NESW	ROBERT & JAMIE SWINGHOLM	SWINGHOLM 23-04-4471 STOCK RESERVOIR	UNA	STO	TREMBEL DRAW
P17506S	10/28/2005	44	71	4	SWSE	ROBERT & JAMIE SWINGHOLM	SWINGHOLM 34-04-4471 STOCK RESERVOIR	UNA	STO	BULL FROG DRAW
P17291S	8/23/2005	44	71	5	SESE	ROBERT & JAMIE SWINGHOLM	SWINGHOLM 44-05-4471 STOCK RESERVOIR	UNA	STO	FROG LEGS DRAW
P18316S	12/18/2006	44	71	6	SWSE	BOLLER MILLS RANCH	BOLLER 34-06-4471 STOCK RESERVOIR	UNA	STO	ROCKY DRAW
P18317S	12/18/2006	44	71	6	SESE	BOLLER MILLS RANCH	BOLLER 44-06-4471 STOCK RESERVOIR	UNA	STO	MILLS DRAW
P17071S	7/22/2005	44	71	7		DURHAM RANCHES, INC.	DURHAM 12-07-4471 STOCK RESERVOIR	UNA	STO	BOOT DRAW
P17280S	8/23/2005	44	71	7	NESE	PAUL R. STUART REVOCABLE TRUST	STUART 43-07-4471 STOCK RESERVOIR	UNA	STO	HAT DRAW
P16798S	12/30/1899	44	71	8		TOM MILLS	BOLLER STOCK RESERVOIR	UNA	STO	BOLLER DRAW (DRNG CLOSED BASIN)
P17668S	9/1/2005	44	71	11	SESE	DALE MILLS TRUST	ENL NORTHEAST STOCK RESERVOIR	UNA	STO	SPRINGEN DRAW NO. ONE
P17670S	9/1/2005	44	71	11	NESE	DALE MILLS TRUST	13-11-44-71 STOCK RESERVOIR	UNA	STO	MILLS NO. 1 DRAW
CU2/171A	10/27/1971	44	71	12	NWNW	INEXCO OIL COMPANY	CENTRAL WSW #5 1	PUW	IND	
32/3/389S	4/11/2005	44	71	13	NESW	CLARK K. MILLS TRUST	NESW 134471 STOCK RESERVOIR	UNA	STO	TRIB WEST FORK COAL CREEK
P4857S	1/26/1963	44	71	14	NENE	CARL J. SPRINGEN	NORTHEAST STOCK RESERVOIR	UNA	STO	SPRINGEN DRAW NO. ONE
P17671S	9/1/2005	44	71	14	NESE	DALE MILLS TRUST	13-14-4471 STOCK RESERVOIR	UNA	STO	ALE DRAW
P17673S	9/1/2005	44	71	14	NWNE	DALE MILLS TRUST	2-14-4471 STOCK RESERVOIR	UNA	STO	SPRINGEN DRAW NO. ONE
P17278S	8/23/2005	44	71	15	SWNE	DALE & EDITH MILLS	JUMPOFF 32-15-4471 STOCK RESERVOIR	UNA	STO	GRAVEL DRAW
P17401S	10/20/2005	44	71	15	NWSE	DALE & EDITH MILLS	MILLS 33-15-4471 STOCK RESERVOIR	UNA	STO	GRAVEL DRAW
P18371S	12/18/2006	44	71	17	NESE	BOLLER MILLS RANCH	BOLLER 43-17-4471 STOCK RESERVOIR	UNA	STO	DRY DRAW
P17175S	8/23/2005	44	71	20	SWSW	DURHAM RANCHES, INC.	SAGER STOCK RESERVOIR	UNA	STO	SAGER DRAW
P17176S	8/23/2005	44	71	20	NWSW	DURHAM RANCHES, INC.	DURHAM 13-20-4471 STOCK RESERVOIR	UNA	STO	SAGER DRAW
P18314S	11/1/2006	44	71	20	SWNE	BOLLER MILLS RANCH	BOLLER 32-20-4471 B STOCK RESERVOIR	UNA	STO	DRY DRAW
P18372S	12/18/2006	44	71	20	SWNE	BOLLER MILLS RANCH	BOLLER 32-20-4471 A STOCK RESERVOIR	UNA	STO	DRY DRAW
P17667S	9/1/2005	44	71	22	SWNE	DALE MILLS TRUST	3-22-4471 STOCK RESERVOIR	UNA	STO	CHEESE DRAW
P17669S	9/1/2005	44	71	23	NENW	DALE MILLS TRUST	5-23-4471 STOCK RESERVOIR	UNA	STO	MILLS NO. 1 DRAW
C27/359A	11/30/1906	44	71	28	SESW	JOHN MORTON SHEEP COMPANY	THUNDER BASIN NO. 1 RESERVOIR	PUO	STO	DRY DRAW
P946R	11/30/1906	44	71	28	SESW	JOHN MORTON SHEEP COMPANY	THUNDER BASIN NO. 1 RESERVOIR	PUO	STO	DRY DRAW



**Supplementary Information on the Affected Environment**

<b>Table S4-5. Surface Water Rights for the West Jacobs Ranch LBA Tract (Continued).</b>										
<b>Permit</b>	<b>Date</b>	<b>T</b>	<b>R</b>	<b>S</b>	<b>QQ</b>	<b>Applicant</b>	<b>Facility Name</b>	<b>Status</b>	<b>Uses</b>	<b>Source</b>
P17790S	3/3/2006	44	71	28	NESW	JAMES & IRENE STUART TRUST	STUART TRUST 23-28-4471 STOCK RESERVOIR	UNA	STO	DRY DRAW
P17789S	3/3/2006	44	71	30	NESW	JAMES & IRENE STUART TRUST	STUART TRUST 23-30-4471 STOCK RESERVOIR	UNA	STO	GRAND VIEW DRAW
P17849S	3/3/2006	44	71	30	SWSE	JAMES & IRENE STUART TRUST	STUART TRUST 34-30-4471 STOCK RESERVOIR	UNA	STO	TULIP DRAW
P1166S	3/3/1955	44	71	31	NESW	PAULINE S. WARD	KELLY #1 STOCK RESERVOIR	PUO	STO	KELLY DRAW
P16678S	9/23/2004	44	71	31		PAUL STUART	STUART #2 STOCK RESERVOIR	UNA	STO	HAUMAN DRAW
P18350S	8/23/2005	44	71	32	NWNW	PAUL R. STUART REVOCABLE TRUST	STUART 11-32-4471 STOCK RESERVOIR	UNA	STO	DRY FORK LITTLE THUNDER CREEK
P2344S	8/4/1958	44	71	34	SENW	PAUL AND RUBY H. STUART	DWIGHT STOCK RESERVOIR	PUO	STO	DWIGHT DRAW
P17672S	9/1/2005	44	71	36	NESW	DALE MILLS TRUST	9-36-4471 STOCK RESERVOIR	UNA	STO	QUIGLEY DRAW
P33346D	11/2/2005	44	71	36	NWSE	E.H. OFTEDAL & SONS, INC.	N. SECTION 36 PLAYA WATER HAUL	UNA	IND, TEM	NORTH SECTION 36 PLAYA (A CLOSED BASIN)
P17072S	7/22/2005	44	72	14	NWNE	DURHAM RANCHES, INC.	DURHAM 31-14-4472 STOCK RESERVOIR	UNA	STO	EAST FORK HAY CREEK
P17075S	7/22/2005	44	72	14	SWNE	DURHAM RANCHES, INC.	DURHAM 32-14-4472 A STOCK RESERVOIR	UNA	STO	EAST FORK HAY CREEK
P17076S	7/22/2005	44	72	14	SWNE	DURHAM RANCHES, INC.	DURHAM 32-14-4472 B STOCK RESERVOIR	UNA	STO	EAST FORK HAY CREEK
P6216S	5/13/1968	44	72	24	SESW	LESTER WRIGHT	LOCKHART STOCK RESERVOIR	PUO	STO	EAST FORK HAY CREEK
P17073S	7/22/2005	44	72	24	NENW	DURHAM RANCHES, INC.	DURHAM 21-24-4472 STOCK RESERVOIR	UNA	STO	NOW DRAW
P17074S	7/22/2005	44	72	24	NWNE	DURHAM RANCHES, INC.	DURHAM 31-24-4472 STOCK RESERVOIR	UNA	STO	HOW DRAW
CU9/365A	2/4/1986	44	72	26	SWNW	WRIGHT WATER AND SEWER DISTRICT	RJ 4	ADJ	MUN	
P16806S	8/11/2004	44	72	26		PAUL STUART	SILK PURSE STOCK RESERVOIR	UNA	STO	SOW DRAW
CU9/361A	2/9/1979	44	72	35	SWNW	WRIGHT WATER AND SEWER DISTRICT	RJ 2	ADJ	MUN	
CU9/362A	2/9/1979	44	72	35	SENW	WRIGHT WATER AND SEWER DISTRICT	RJ 3	ADJ	MUN	
CU9/363A	4/5/1979	44	72	35	NENW	WRIGHT WATER AND SEWER DISTRICT	RJ 5	ADJ	MUN	
P16807S	8/11/2004	44	72	35		PAUL STUART	CHURCH STOCK RESERVOIR	UNA	STO	FEVER DRAW
P16679S	9/23/2004	44	72	36	NESE	PAUL STUART** WYO STATE OFFICE OF LANDS & INVESTMENTS	STUART #3 STOCK RESERVOIR	UNA	STO	DRY FORK LITTLE THUNDER CREEK

#### **S4-6 ALLUVIAL VALLEY FLOORS**

Under the Surface Mining Control and Reclamation Act of 1977 (SMCRA), surface coal mining operations that would interrupt, discontinue, or preclude farming on alluvial valley floors (AVFs) is prohibited unless the affected AVF is undeveloped rangeland that is not significant to farming or if the affected AVF is of such small acreage that it would have a negligible impact on a farm's agricultural production. These restrictions also apply if AVFs that are downstream of the area proposed for mining would be affected by disruptions in streamflow. Provided Wyoming Department of Environmental Quality/Land Quality Division (WDEQ/LQD) determines that an AVF is not significant to agriculture, it can be disturbed by mining but must be restored as part of the reclamation process. For any designated AVF, regardless of its significance to agriculture, it must be demonstrated that the essential hydrologic functions of the AVF, both within and outside the mine area, will be protected.

WDEQ regulations define AVFs as unconsolidated stream laid deposits where water availability is sufficient for subirrigation or flood irrigation agricultural activities. Guidelines established by the Office of Surface Mining Reclamation and Enforcement (OSM) and WDEQ/LQD for the identification of AVFs require detailed studies of geomorphology, soils, hydrology, vegetation, and land use. These studies are used to identify: 1) the presence of unconsolidated stream laid deposits, 2) the possibility for artificial flood irrigation, 3) past and/or present flood irrigation, and 4) apparent subirrigated areas and the possibility for natural flood irrigation. Areas that are identified as AVFs following these studies are evaluated for their significance to farming by WDEQ/LQD.

In a decision by the U.S. District Court for the District of Columbia, Civil Action Number 69-1144 (1980) (known as the Flannery Decision), the court noted that an AVF must satisfy both geologic criteria (unconsolidated stream laid deposits) and hydrologic criteria (water sufficient to sustain agriculture). Therefore, the court emphasized that the key to the existence of an AVF is the presence of both geologic and water availability characteristics, which together sustain agricultural activities.

North Prong Little Thunder Creek and Dry Fork Little Thunder Creek drain most of the tract's general analysis area. Springen Draw, an ephemeral tributary to an internally-drained playa, drains a small area in the northeastern corner of the West Jacobs Ranch tract's general analysis area. All streams within and adjacent to the West Jacobs Ranch LBA Tract are ephemeral, responding to precipitation and snowmelt. Runoff is typically of short duration and exhibits temporal patterns similar to precipitation events, although limited bank storage may extend stream flow for longer periods. Streams in the region generally exhibit a low-flow period from October through January, while snowmelt and spring rainfall produce larger flows.

Alluvial valley fill deposits have been mapped by the U.S. Geological Survey (Reheis and Coats 1987, Coates 1978a and 1978b) and JRCC (1994) only along

Dry Fork Little Thunder Creek (from the southern boundary of Section 33, T.44N., R.71W. to the center of Section 2, T.43N., R.71W.) and its tributary, Brater Draw (Figure S4-4). These unconsolidated stream laid deposits consist of intermixed silt and sand locally interbedded with thin clay or gravel lenses and range from about 1.0 to 10.0 feet thick. Groundwater occurrence in the alluvium is generally unknown in this area, but limited occurrence may be expected as bank storage from ephemeral stream flows. Available water quality data indicate that groundwater from the valley fill deposits of Little Thunder Creek and North Prong Little Thunder Creek does not meet the WDEQ/WQD standards for domestic and agricultural uses and is marginal or fails to meet the standards for livestock and wildlife use, depending on the location (TBCC 2007). Surface water quantity and quality are insufficient to support agricultural activities.

Other drainages on the West Jacobs Ranch tract are much smaller and AVF characteristics are negligible. Few stream laid deposits are present; the streams do not consistently produce enough runoff to be put to beneficial use, and the soils that dominate the drainage bottoms within the general analysis area are classified by the Natural Resource Conservation Service (NRCS) as unsuitable for irrigation. In addition, there are no present or historical records of agricultural use, other than undeveloped range land, of the stream channels and associated stream laid deposits within the general analysis area for the tract.

If the West Jacobs Ranch LBA Tract is leased and proposed for mining, an AVF assessment would be part of the mine permitting process, and formal declarations of the presence or absence of an AVF, its significance to agriculture, and the appropriate perimeter (areal extent) would be made by the WDEQ/LQD as part of the permitting process. Although published geologic mapping indicates that there are few streamlaid deposits, detailed mapping in accordance with WDEQ requirements would be completed to verify the presence or absence of these deposits and their relevance to potential AVFs in the area proposed for mining. Based on previous non-AVF declarations made on North Prong Little Thunder Creek and Dry Fork Little Thunder Creek downstream of the West Jacobs Ranch tract and within the existing Black Thunder Mine permit area, which includes a portion of the West Jacobs Ranch LBA Tract as applied for, it is unlikely that WDEQ/LQD would declare that any AVF characteristics exist in the general analysis area for the West Jacobs Ranch tract. The declared AVF at the North Prong Little Thunder Creek and Little Thunder Creek confluence is located over 7 miles downstream from the West Jacobs Ranch LBA Tract and would not be affected by mining and reclamation within the tract.

#### **S4-7 WETLANDS**

The federal and state regulatory programs, which are administered by the U.S. Army Corps of Engineers (COE) and Wyoming Department of Environmental Quality/Land Quality Division (WDEQ/LQD), respectively, that require special permitting procedures to assure that after mining there are no net loss of

wetlands are described in Section S1-7. A description of wetland types and Other Waters of the United States (OWUS) from a permitting perspective is also given in Section S1-7.

A preliminary wetlands inventory of the general analysis area for the West Jacobs Ranch LBA Tract, based on United States Fish and Wildlife Service (USFWS) National Wetlands Inventory (NWI) mapping (1980) and a field survey reconnaissance, was conducted in 2007 and 2008 by Intermountain Resources (IR) of Laramie, Wyoming. The NWI maps were consulted prior to the initiation of IR's preliminary wetland field survey; however, the boundaries of the existing potential wetlands vary to a greater or lesser extent from the boundaries shown on the NWI maps. IR's field reconnaissance indicated that wetland areas previously mapped by the USFWS NWI in 1980 have been recently altered due to coal bed natural gas (CBNG)-related water production within and upstream of the tract's general analysis area. Due to the ephemeral nature of CBNG dewatering activities, the boundaries, and therefore wetland areas, are likewise ephemeral.

This wetland resource reconnaissance inventory was completed using the COE 1987 Wetland Delineation Manual. Wetland sites were evaluated based on the presence of hydrophytic vegetation, hydric soils and wetland hydrology. Channel other waters were based on "bed and bank", while ponded other waters were based on visual open water or evidence of ponding (barren areas with high water marks).

Within the entire general analysis area for the West Jacobs Ranch LBA Tract (9,370.4 acres), the preliminary inventory identified a total of 68.4 acres of wetlands and Other Waters of the U.S (OWUS). These wetlands and other waters may consist of either jurisdictional or non-jurisdictional sites, but those determinations can only be made by the COE. Wetlands and/or other waters were found within four general land categories: ponds, ephemeral streams, playas and depressions. Acreages of vegetated wetlands, channel OWUS, and ponded OWUS were estimated for each of the four categories and are shown in Table S4-6. Figure S4-5 depicts IR's preliminary wetland mapping within the general analysis area (wetlands analysis area) for the West Hilight Field LBA Tract.

Table S4-6. Preliminary Wetlands and OWUS Areas<sup>1</sup> Estimated on the General Analysis Area for the West Jacobs Ranch LBA Tract.

	Vegetated Wetlands	Channel Other Waters	Ponded Other Waters
Ponds	4.7	--	14.1
Ephemeral Streams	7.8	4.9	2.1
Playas	1.7	--	30.6
Depressions	2.5	--	--
Estimated Totals	16.7	4.9	46.8

<sup>1</sup> in acres

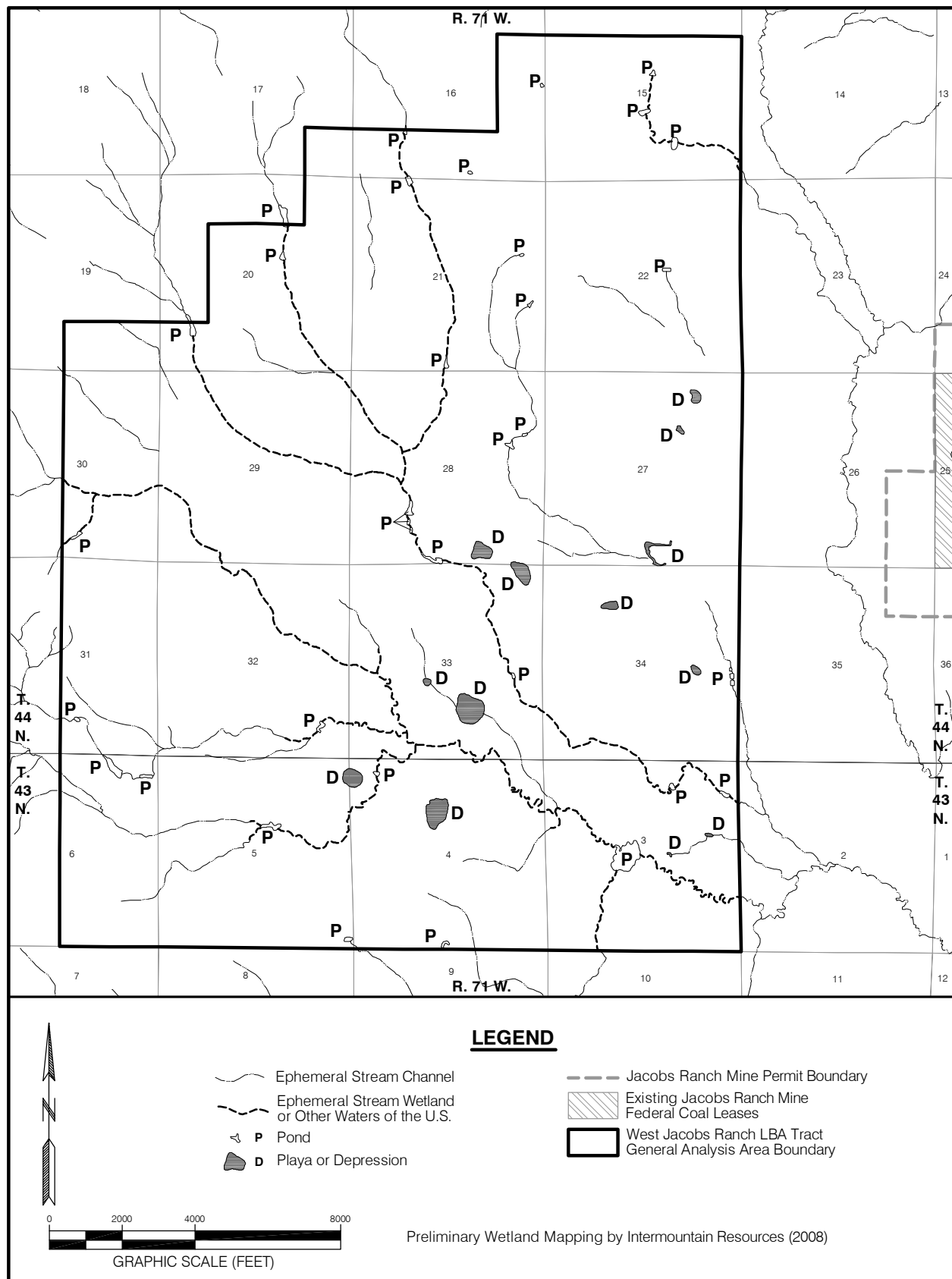


Figure S4-5. Wetlands Within the General Analysis Area for the West Jacobs Ranch LBA Tract.

All of these wetlands and other waters are classified as palustrine. Most of the wetlands have emergent vegetation consisting primarily of spikerush (*Eleocharis* sp.), cattail (*Typha latifolia*), alkali bulrush (*Scirpus maritimus*), foxtail barley (*Hordeum jubatum*), rush (*Juncus* sp.) and alkali cordgrass (*Spartina gracilis*). The ponds and playas have aquatic bed and are seasonally or temporarily flooded with little to no vegetation. These areas are generally either inundated during wet periods or barren during dry periods.

A wetland delineation would be conducted and submitted to the COE with a formal Section 404 Jurisdictional Determination request as part of the WDEQ/LQD mine permitting process, if the tract is leased.

#### **S4-8 SOILS**

Soils within the entire general analysis area for the West Jacobs Ranch LBA Tract was evaluated in 2007 using the National Resource Conservation Service (NRCS) Order 3 soil survey information for southern Campbell County (Prink et al. 2004) and field surveys. NRCS Order 3 mapping is completed according to national guidelines and standards.

Soils vary depending upon where and how they were formed. Major factors involved in the formation of soils include whether or not the material was transported and how the material was weathered during transportation. Four primary soil formation processes causing different soil types were noted in this area: 1) those soils developing predominantly in thin residuum from sandstone or shale on upland ridges, 2) those soils developing predominantly in slopewash, colluvium, or alluvial fan deposits from mixed sources on gently sloping uplands, 3) those soils developing predominantly in coarse-textured alluvium or sandy eolian deposits on rolling uplands, and 4) soils developing in mixed stream laid alluvium on terraces and channels, and in fine-textured playa deposits in depressions and closed basins.

Soils within the general analysis area were identified by series, which consist of soils that have similar horizons in their profile. Horizons are soil layers having similar color, texture, structure, reaction, consistency, mineral and chemical composition, and arrangement in the profile. The soil depths and types in the general analysis area for the West Hilight Field tract are similar to soils currently being salvaged and utilized for reclamation at the neighboring Black Thunder and Jacobs Ranch mines, as well as other mines in the eastern PRB.

The following is a list of the soil types delineated in the tract's BLM study area (note that some series determinations have changed since the original surveys were completed). The major soils series encountered within the soil survey area were grouped according to the primary soil formation processes and are listed as follows:

***Soils developing predominantly in thin residuum from sandstone or shale on upland ridges and hills***

- Renohill-Savageton clay loams, 6 to 15 percent slopes
- Terro-Taluze sandy loams, 6 to 30 percent slopes
- Theedle-Kishona loams, 6 to 20 percent slopes
- Theedle-Shingle loams, 3 to 30 percent slopes
- Turnercrest-Wibaux, thin solum- Taluze complex, 6 to 40 percent slopes
- Wibaux-Wibaux, thin solum Complex, 6 to 40 percent slopes
- Wibaux-Shingle-Badland Complex, 6 to 60 percent slopes

***Soils developing predominantly in colluvium or alluvial fan deposits from mixed sources on gently sloping uplands***

- Bidman loam, 0 to 6 percent slopes
- Bidman-Parmleed loams, 0 to 6 percent slopes
- Bidman-Parmleed loams, 6 to 15 percent slopes
- Bidman-Ulm loams, 0 to 6 percent slopes
- Decolney-Hiland fine sandy loams, 0 to 6 percent slopes
- Decolney-Hiland fine sandy loams, 6 to 15 percent slopes
- Forkwood-Cushman loams, 0 to 6 percent slopes
- Heldt-Bidman Complex, saline, 0 to 3 percent slopes
- Hiland-Bowbac fine sandy loams, 0 to 6 percent slopes
- Hiland-Bowbac fine sandy loams, 6 to 15 percent slopes
- Ulm-Renohill clay loams, 0 to 6 percent slopes

***Soils developing predominantly in coarse-textured residuum, alluvium and sandy eolian deposits on rolling uplands***

- Hiland-Vonalee fine sandy loams, 6 to 15 percent slopes
- Keeline-Tullock loamy sands, 6 to 30 percent slopes
- Keeline-Tullock-Niobrara, dry complex, 3 to 30 percent slopes
- Maysdorf fine sandy loam, 0 to 6 percent slopes
- Maysdorf-Pugsley sandy loams, 0 to 6 percent slopes
- Maysdorf-Pugsley sandy loams, 6 to 15 percent slopes
- Moskee fine sandy loam, 6 to 10 percent slopes
- Orpha-Tullock loamy sands, 6 to 30 percent slopes

***Drainage soils developing in mixed stream laid alluvium on terraces and channels and in fine-textured playa deposits in depressions and closed basins***

- Arvada, thick surface-Arvada-Slickspots complex, 0 to 6 percent slopes
- Felix clay, ponded, 0 to 2 percent slopes

Table S4-7 provides the extent of five depth classes of suitable topsoil within the general analysis area.

Table S4-7. Acres of Topsoil Available for Reclamation Within the General Analysis Area for the West Jacobs Ranch LBA Tract.

<b>Thickness of Suitable Topsoil (inches)</b>	<b>Acres</b>	<b>Percent</b>
0	31.0	0.3
0 – 12	2,249.2	24.0
12 – 30	2,585.2	27.6
30 – 48	3,736.3	39.9
48 – 60	766.5	8.2
> 60	0.00	0.0
<b>Total</b>	<b>9,370.4</b>	<b>100.0</b>

The West Jacobs Ranch LBA Tract baseline soils analysis, in conjunction with the county-wide NRCS soil survey, indicates that the amount of suitable topsoil that would be available for redistribution on all disturbed acres within the analysis area during reclamation would have a depth of 2.2 to 3.0 feet. Areas of unsuitable soils include sites with high alkalinity, salinity, clay content, coarse fragments, and lands previously disturbed by other activities. The tract is expected to have adequate quantity and quality of soil for reclamation.

Future soil surveys will be completed to an Order 1-2 resolution in accordance with WDEQ/LQD Guideline No. 1, which outlines required soils information necessary for a coal mining operation, if the tract is leased and proposed for mining. These inventories will include field sampling and observations at the requisite number of individual sites, and laboratory analysis of representative collected soil samples.

#### **S4-9 VEGETATION**

The vegetation communities in the general analysis area for the West Jacobs Ranch LBA Tract (9,370.4 total acres) were appraised and mapped by Intermountain Resources of Laramie, Wyoming in 2007 and 2008. Vegetation communities in this area were delineated and mapped in accordance with the current Wyoming Department of Environmental Quality/Land Quality Division (WDEQ/LQD) requirements. Mapping was completed directly in the field using aerial photography, and map units were determined using dominant vegetation, position on the landscape, soils and past or present land uses.

Vegetation within the LBA tract's general analysis area consists of species common to eastern Wyoming. A total of eight vegetation types have been identified and mapped within the LBA tract's general analysis area. Table S4-8 presents the acreage and percent of the general analysis area encompassed by each vegetation type. The vegetation (and land use) types include Crested Wheatgrass Pastureland, Upland Grassland, Big Sagebrush Shrubland, Rough Breaks, Disturbed Lands, Playa, Bottomland Grassland and Reservoir.



Table S4-8. Vegetation Types Identified and Mapped Within the West Jacobs Ranch LBA Tract.

Vegetation Type	Acres	Percent of Area
Crested Wheatgrass Pastureland	3,757.0	40.1
Upland Grassland	3518.2	37.6
Big Sagebrush Shrubland	1,259.2	13.4
Rough Breaks	514.6	5.5
Disturbed Lands	151.1	1.6
Playa	74.4	0.8
Bottomland Grassland	70.0	0.7
Reservoir	25.9	0.3
<b>Total</b>	<b>9,370.4</b>	<b>100.0</b>

In terms of total acres of occurrence in the general analysis area, the predominant vegetation types are Crested Wheatgrass Pastureland (roughly 40 percent), Upland Grassland (roughly 38 percent), and Big Sagebrush Shrubland (roughly 13 percent).

These types are described as follows:

The **Crested Wheatgrass Pastureland** vegetation type occurs throughout the study area and is found on relatively flat areas to rolling plains with moderately deep to deep soils. Crested wheatgrass (*Agropyron cristatum*) was the most common perennial species recorded on this vegetation type. Needleandthread (*Stipa comata*), red threeawn (*Aristida longiseta*) and blue grama (*Bouteloua gracilis*) were also common perennial grasses recorded on Crested Wheatgrass Pastureland. Common annual species recorded on this vegetation type include cheatgrass brome (*Bromus tectorum*) and sixweeksgrass (*Vulpia octoflora*). Shrub and subshrub species are typically absent from this vegetation type.

The **Upland Grassland** vegetation type is found throughout the general analysis area. Upland grasslands were present on relatively flat areas to rolling plains with moderately deep to deep soils. This vegetation type is dominated primarily by perennial grasses, which include needleandthread, western wheatgrass (*Pascopyrum smithii*), blue grama, Sandberg bluegrass (*Poa secunda*) and prairie junegrass (*Koeleria macrantha*). Common annual species include cheatgrass brome, Japanese brome (*Bromus japonicus*), fluffweed (*Filago arvensis*) and alyssum (*Alyssum* sp.). Annual grasses and forbs were abundant in 2007. Shrub and subshrub species are uncommon throughout this vegetation type but may be prominent in isolated patches.

The **Big Sagebrush Shrubland** vegetation type typically occurs in upland positions throughout the study area with varied topography on shallow to deep soils. Major perennial species include big sagebrush (*Artemisia tridentata*), western wheatgrass, prairie junegrass, Sandberg bluegrass, needleandthread

and blue grama. Annual species that are common on this vegetation type include Japanese chess, cheatgrass brome and alyssum. Annual grasses and forbs were abundant in 2007. Big sagebrush is the dominant shrub species found on this vegetation type with several subshrub species also present on these areas.

The **Rough Breaks** vegetation type typically occurs in upland positions, hills and steep slopes with shallow and sometimes coarse soils. Rough breaks are found primarily on the north and west portions, of the general analysis area. Major perennial species include bluebunch wheatgrass (*Elymus spicatus*), big sagebrush, western wheatgrass, prairie junegrass and blue grama. Annual species that are common on this vegetation type include Japanese chess and cheatgrass brome. Annual grasses and forbs were abundant on this type in 2007. Big sagebrush is the most common shrub species occurring on this vegetation type. There are also several subshrub species that are commonly observed on this type.

The **Disturbed Lands** type is made up of past disturbance, primarily from oil and gas production, ranching facilities, and roadways.

The **Playa** vegetation type is found on depressions within closed drainage basins on heavy, sometimes saline, clay soils. The dominant species was western wheatgrass, inland saltgrass (*Distichlis stricta*), spikerush (*Eleocharis* sp.), foxtail barley (*Hordeum jubatum*) and povertyweed (*Iva axillaris*). However, many of the playas were barren because of unsuitable soils (clay, saline) and frequently contained water. Shrub and subshrub species are generally absent from this vegetation type.

The **Bottomland Grassland** vegetation type is found primarily along the major drainages in the area. These sites generally have deep soils. The most dominant species on this vegetation type include western wheatgrass, Kentucky bluegrass (*Poa pratensis*), green needlegrass (*Stipa viridula*), alkali cordgrass (*Spartina gracilis*) and inland saltgrass. Shrub and subshrub species are found in limited numbers on this type. Wetlands were included in this map unit and are discussed in the Wetlands section of this document.

The **Reservoir** map unit consists primarily of stockponds created by dikes constructed in drainage channels. Water in the stockponds has been supplemented by recent discharges from CBNG wells.

Trees on the resource study area are found primarily in windbreaks/shelterbelts planted adjacent to two ranching facilities; one of which was occupied and the other was abandoned. Only a few small trees are present on the remainder of the general analysis area due to lack of water and suitable habitats. The most common trees present in windbreaks were plains cottonwood (*Populus deltoids*), Siberian elm (*Ulmus pumila*) and blue spruce (*Picea pingens*). Of the two windbreaks present on the area, the largest had over several hundred trees while the other had less than 100 trees. Less than

20 trees are present scattered across the remainder of the general analysis area.

## **S4-10 WILDLIFE**

### **S4-10.1 Wildlife Resources**

Background information on wildlife in the vicinity of the West Jacobs Ranch LBA Tract was drawn from several sources including, Wyoming Game and Fish Department (WGFD) and U.S. Fish and Wildlife Service (USFWS) records, the Wyoming Natural Diversity Database (WYNDD), recent PRB federal coal lease application EIS documents (available for public review on Wyoming BLM's website at <http://www.blm.gov/wy/st/en.html>), and personnel contacts with WGFD, BLM and USFWS biologists. Site-specific data for the LBA tract's general analysis area were obtained from sources including WDEQ/LQD permit applications and annual wildlife monitoring reports for nearby mines. Baseline and annual wildlife surveys, which cover large perimeters around each mine's permit area, have been conducted for the adjacent mines since the mid-1970s. Consequently, a portion of the wildlife survey area for the West Jacobs Ranch tract has previously been surveyed for wildlife species as part of the required monitoring surveys for these adjacent mines. In addition, Jacobs Ranch Coal Company (JRCC) initiated baseline field investigations in 2007 and 2008 expressly for the West Jacobs Ranch LBA Tract. Intermountain Resources (IR), of Laramie, Wyoming, has conducted both the historical and recent wildlife studies specifically for JRCC. The results of site-specific surveys for the entire leased area and appropriate perimeter will be part of the mine permitting process if the lease sale is held and the tract is proposed for mining.

The LBA tract and adjacent area consist primarily of uplands. The topography is predominantly level to rolling, with some areas along the tract's northern and western edges that are sloping to steeply sloping. Vegetation types tend to occur in a mosaic across the landscape; therefore, many wildlife species can be expected to utilize more than one habitat type. Predominant habitat types classified on the LBA tract and adjacent area correspond with the major plant communities defined by the vegetation survey and consist primarily of crested wheatgrass pastureland (roughly 40 percent), upland grassland (roughly 38 percent), and big sagebrush shrubland (roughly 13 percent). These habitats are characterized by level ground to rolling hills that are well vegetated. Rough breaks and bottomland grassland habitat types are found on the tract's general analysis area along the drainages. Disturbed lands include a network of oil and gas field access roads and areas surrounding oil and gas development activities (i.e., well pads, pipelines, tank batteries), mining-related facilities and activities, and both active and abandoned ranching-related facilities. Reclaimed lands include areas that were recently reclaimed after disturbance for the installation of oil and gas facilities or pipelines, road construction and other activities with varying degrees of recovering vegetation cover. All streams on the LBA tract are ephemeral. Numerous reservoirs/stockponds exist on the LBA tract along with several playas. The majority of the trees on the tract were

planted around ranch buildings. A few other isolated trees exist on the tract along drainages.

#### **S4-10.2 Big Game**

Two big game species commonly occur on and in the vicinity of the LBA tract: pronghorn (*Antilocapra americana*) and mule deer (*Odocoileus hemionus*). WGFD big game herd unit maps show this area is out of the normal elk (*Cervus elaphus*) and white-tailed deer (*Odocoileus virginianus*) range, although the white-tailed deer was observed on the LBA tract in 2007. The WGFD has classified the tract as yearlong pronghorn range (a population or substantial portion of a population of animals makes general use of this habitat on a year-round basis, but may leave the area under severe conditions on occasion). The vast majority of the tract is also classified as primarily yearlong mule deer range.

Pronghorn are, by far, the most common big game species in the area. The LBA tract is within the WGFD's pronghorn Hilight Herd Unit (pronghorn Hunt Area 24). None of the LBA tract or areas within 2 miles has been classified as crucial pronghorn habitat. In post-season 2007, the WGFD estimated the Hilight Herd Unit population to be approximately 12,397 animals, which is above the WGFD objective of 11,000 (WGFD 2007a).

Home range for pronghorn can vary from between 400 to 5,600 acres, according to several factors including season, habitat quality, population characteristics and local livestock occurrence. Typically, daily movements do not exceed 6 miles. Pronghorn may make seasonal migrations between summer and winter habitats, but these migrations may be triggered by preferred forage availability and not local weather conditions. Since only about 13 percent of the LBA tract's general analysis area is dominated by big sagebrush and the remainder is some type of grassland, the area does not contain abundant pronghorn winter habitat. Pronghorn were observed using all habitat types (upland grassland, crested wheatgrass pastureland, big sagebrush shrubland, rough breaks, bottomland grasslands and playas) during the 2007 surveys.

The LBA tract's general analysis area is located within the western portion of the WGFD Thunder Basin Mule Deer Herd Unit (deer Hunt Area 21). Crucial mule deer ranges do not occur on or within several miles of the LBA tract. In recent years the mule deer population has been estimated to be at, or near the current objective of 20,000 animals (WGFD 2007a). Based on observations in 2007, mule deer had an affinity for the rough breaks and bottomland grassland habitats within and adjacent to the LBA tract. Mule deer use nearly all habitats, but prefer sagebrush grassland, rough breaks, and riparian bottomland. Browse is an important component of the mule deer's diet throughout the year, comprising as much as 60 percent of total intake during autumn, while forbs and grasses typically make up the rest of their diet (Fitzgerald et al. 1994). Mule deer are frequently observed on mine reclaimed

lands. In certain areas of the state this species tends to be more migratory than white-tailed deer, traveling from higher elevations in the summer to winter ranges that provide more food and cover. Mule deer are not considered to be migratory in this area and preferred winter habitats comprised of big sagebrush shrublands (including the big sagebrush component of the rough breaks type).

The West Jacobs Ranch LBA Tract's general analysis area is located within the WGFD Central White-tailed Deer Herd Unit (deer Hunt Area 21). White-tailed deer are managed and hunted in conjunction with mule deer. White-tailed deer prefer riparian habitats and are therefore seldom observed in the general analysis area due to the lack of that particular habitat and are considered transient to the area. The WGFD classifies the entire general analysis area as out of the normal white-tailed deer use range. A narrow corridor along Antelope Creek south of the tract's general analysis area is classified as yearlong range. White-tailed deer are occasionally recorded along the Belle Fourche River and Pine Hills to the east but have rarely been recorded in the general analysis area. The WGFD does not have population estimates for this herd unit due to the challenges of obtaining adequate classifications in many hunt areas within the herd unit. Only one observation of this species (in bottomland grassland) was recorded in 2007.

A resident elk herd resides in the Rochelle Hills east of the LBA tract's general analysis area. The LBA tract is not generally considered by the WGFD to be within normal elk use area, although elk have been recorded in the past several miles to the east in the pine breaks. None of the tract's general analysis area or areas within two miles have been classified as crucial elk habitat. The nearest crucial elk habitat is over 10 miles to the east on reclaimed areas within the Jacobs Ranch Mine. In that area, the WGFD (Oedekoven 1994) has designated an approximately 5 square mile area on reclaimed or adjacent lands as crucial winter habitat for the Rochelle Hills elk herd. As more lands are reclaimed from mining, elk are shifting their winter use to these areas. RTEA (owner of the Jacobs Ranch Mine) and the Rocky Mountain Elk Foundation (RMEF) finalized a formal agreement that created the Rochelle Hills Conservation Easement. The easement contains nearly 1,000 acres, with 75 percent of that total comprised of reclaimed mining lands on the Jacobs Ranch Mine. The easement acreage was donated to RMEF by RTEA to ensure that the reclaimed land continues to be used as grazing land and wildlife habitat for the extended future (RMEF 2007). The WGFD estimated the 2007 post-season elk population for the Rochelle Hills Herd Unit at 600, which is 50 percent above the current objective of 400 animals (WGFD 2007a).

#### **S4-10.3 Other Mammals**

A variety of small and medium-sized mammal species occur in the vicinity of the West Jacobs Ranch LBA Tract, although not all have been observed on the general analysis area for the tract itself. These include predators and furbearers, such as the coyote (*Canis latrans*), red fox (*Vulpes vulpes*), bobcat

(*Lynx rufus*), striped skunk (*Mephitis mephitis*), badger (*Taxidea taxus*), long-tailed weasel (*Mustela frenata*), muskrat (*Ondatra zibethicus*), beaver (*Castor canadensis*), and raccoon (*Procyon lotor*). Prey species include rodents such as mice, voles, chipmunks and black-tailed prairie dogs (*Cynomys ludovicianus*) and lagomorphs (jackrabbits and cottontails). These prey species are cyclically common and widespread throughout the region. They are important prey items for raptors and other predators. Porcupines (*Erethizon dorsatum*) and bats (such as hoary [*Lasiurus cinereus*] and big brown [*Eptesicus fuscus*]) also have habitat in the vicinity, which is primarily in the pine forest habitat of the nearby Rochelle Hills.

Qualified wildlife biologists with IR have mapped the current acreage of prairie dog colonies in the vicinity of the Jacobs Ranch and Black Thunder mines by walking the perimeters of colonies and delineating them using hand-held global positioning system (GPS) receivers and/or by visually mapping them on topographic maps. Surveys for prairie dog colonies were conducted on and within 2 miles of the general analysis area for the LBA tract. One black-tailed prairie dog colony (approximately 17.9 acres in size) was documented on the LBA tract as applied for, and five other colonies, which are approximately 2.6, 3.4, 7.7, 19.5, and 27.2 acres in size, were documented outside of the tract's general analysis area but within 2 miles of the tract. These six colonies are depicted on Figure 3-35 in the WAC DEIS.

The swift fox (*Vulpes velox*) was observed on the tract's general analysis area twice in 2007.

#### **S4-10.4 Raptors**

Numerous raptor and owl species have been observed on or adjacent to the West Jacobs Ranch LBA Tract. These species include the golden eagle (*Aquila chrysaetos*), northern harrier (*Circus cyaneus*), Swainson's hawk (*Buteo swainsoni*), red-tailed hawk (*Buteo jamaicensis*), ferruginous hawk (*Buteo regalis*), rough-legged hawk (*Buteo lagopus*), sharp-shinned hawk (*Accipiter striatus*), prairie falcon (*Falco mexicanus*), peregrine falcon (*Falco peregrinus*), merlin (*Falco columbarius*), American kestrel (*Falco sparverius*), osprey (*Pandion haliaetus*), turkey vulture (*Carthartes aura*), great horned owl (*Bubo virginianus*), short-eared owl (*Asio flammeus*), long-eared owl (*Asio otus*), burrowing owl (*Athene cunicularia*) and snowy owl (*Nyctea scandiaca*). The bald eagle (*Haliaeetus leucocephalus*) is a migrant and common winter resident of the Wyoming Powder River Basin region. On July 9, 2007, the U.S. Fish and Wildlife Service (USFWS) published a Federal Register notice (72 FR 37346) announcing that the bald eagle would be removed from the list of threatened and endangered (T&E) species under the Endangered Species Act of 1973 (ESA), as amended (16 U.S.C 1531 et seq.); that de-listing was effective as of August 8, 2007. However, the protections provided to the bald eagle under the Bald and Golden Eagle Protection Act (BGEPA), 16 U.S.C. 668, and the Migratory Bird Treaty Act (MBTA), 16 U.S.C. 703, will remain in place. The bald eagle is now recognized as a USFS and BLM Sensitive Species.

Numerous raptor species have been observed nesting on or near the LBA tract. Raptor species that are known to commonly nest in the general Wright analysis area are the golden eagle, ferruginous hawk, red-tailed hawk, Swainson's hawk, great horned owl, and burrowing owl. No nest sites have been documented in the general Wright analysis area for American kestrels, northern harriers, or short-eared owls, though occasional sightings of recently fledged young indicate that such activities do occur there for one or more of these species. Habitat is limited for those species that nest exclusively in trees or on cliffs, but several species are adapted to nesting on the ground, creek banks, buttes, or rock outcrops. Rough-legged hawks are winter residents in northeast Wyoming, and breed in the arctic regions.

Figure 3-35 in the WAC DEIS shows the locations of raptor nest sites that have been identified within the West Jacobs Ranch LBA Tract wildlife study area (2-mile perimeter encompassing the general analysis area). Due to the West Jacobs Ranch LBA Tract's proximity to the three Hilight Field LBA Tracts, there is an overlap in the reporting of raptor nests. The number of nests recorded within each of the wildlife survey areas are addressed separately in this supplemental information document, as well as in Section 3.10 of the WAC DEIS document. Over time, raptors have built new nests and natural forces have destroyed many nests, while others have been relocated for mitigation or removed by mining activities. In some cases, nests have been created to mitigate other nest sites impacted by mining operations at this mine.

The 2007 and 2008 raptor nest surveys by IR identified a total of 44 intact raptor nests (33 ferruginous hawks nests, two golden eagle nests, three burrowing owl nest, three Swainson's hawk nests, and three nests that have been used by multiple raptor species) in the West Jacobs Ranch wildlife study area boundary. Nine intact nests were within the West Jacobs Ranch tract's general analysis area: one intact nest (Swainson's hawk) was recorded on the Jacobs Ranch LBA Tract as applied for, two additional intact raptor nest sites (one golden eagle and one Swainson's hawk) were present on the additional lands evaluated by BLM under Alternative 2, and six more intact nests (five ferruginous hawk and one golden eagle) were present within the ¼-mile disturbance buffer. Three of the nine intact nests (one golden eagle, one Swainson's hawk, and one ferruginous hawk) within the tract's general analysis area were active in 2007 and 2008. The remaining 35 intact nests were within 2 miles of the tract's general analysis area.

#### **S4-10.5 Upland Game Birds**

Several upland game bird species have been observed on the West Jacobs Ranch LBA Tract or adjacent areas, including sage-grouse (*Centrocercus urophasianus*) and migratory mourning doves (*Zenaida macroura*). Based on field observations, the mourning dove was the more common of the two species. The mourning dove only inhabits the area for breeding and reproduction from late spring to early fall and during migration.

The sage-grouse is a yearlong resident and was historically found on lands within and adjacent to the West Jacobs Ranch LBA. The Jacobs Ranch and Black Thunder Mines conduct surveys of known sage-grouse leks and searches for new leks each spring as part of their annual wildlife monitoring requirements for WDEQ/LQD. Each active lek is generally surveyed three times within a given breeding season. Baseline inventories included the respective mine permit areas and a 2-mile perimeter, and occurred prior to permitting by WDEQ/LQD. Annual surveys include the mines' permit areas and a 1-mile perimeter, and began when each mine was initially permitted in the early 1980s. As a result, most of the area included in the proposed West Jacobs Ranch LBA Tract has been included in previous regular survey efforts. Those surveys became mandatory with the implementation of Appendix B of the WDEQ/LQD Coal Rules and Regulations in 1993. In May 2002, the USFWS office in Cheyenne, Wyoming, released a list entitled *Coal Mine List of 40 Migratory Bird Species of Management Concern in Wyoming*, which replaced the previous *Migratory Birds of High Federal Interest List*. The greater sage-grouse is included on the updated list, giving further impetus to ongoing annual survey efforts.

Two sage-grouse leks have been documented in or within 2 miles of the West Jacobs Ranch tract's general analysis area: Stuart I and Stuart II (Figure 3-35 in the WAC DEIS depicts locations). The Stuart I lek is located approximately 1.3 miles southwest of the tract's general analysis area and the Stuart II lek is located approximately 1 mile south of the LBA tract as applied for. These two particular leks were last recorded active in 1991 when only two males were observed on the Stuart I lek and seven males were observed on the Stuart II lek. Since 1991 the Stuart I lek has been surveyed 17 times and the Stuart II lek has been surveyed 21 times but no sage-grouse or sign were found during those surveys. While displaying males have not been recorded at either of these two leks for over ten years (not since 1991 at both sites), there is insufficient data to indicate that they are abandoned; therefore, both leks are presently classified "undetermined" (insufficient information to designate the leks as unoccupied). The Stuart I lek would probably not be re-occupied in the near future due to the presence of a CBNG compression station and other CBNG development facilities within ¼ mile of the lek site. The Stuart II lek would probably not be re-occupied in the near future due to the presence of CBNG access roads and other CBNG facilities within ¼ mile of the lek site (IR 2008). Sage-grouse were not observed on the study area during surveys completed by IR during 2007, nor were they observed on lands adjacent to the West Jacobs Ranch LBA Tract in 2007.

#### **S4-10.6 Migratory Bird Species of Management Concern in Wyoming**

Thirty of the 40 listed Level I and II species have historically been observed within northeastern Wyoming (Latilong 13) and 18 species have been recorded in the vicinity of the West Jacobs Ranch LBA Tract (Table S4-9). The USFWS considers Level I species as in need of conservation action, which includes having a monitoring and mitigation plan for those birds. The 16 Level I and II



*Supplementary Information on the Affected Environment*

**Table S4-9. Migratory Bird Species of Management Concern in Wyoming: Their Regional Status, and Expected and Actual Occurrence on or Near the West Jacobs Ranch LBA Tract.**

<b>Species<sup>1</sup> (Scientific Name)</b>	<b>Seasonal Status/Breeding Records in Northeastern WY<sup>1</sup></b>	<b>Historical Occurrence in Vicinity of the LBA<sup>2</sup></b>	<b>Occurrence and Status in the LBA tract<sup>3</sup></b>
<b>LEVEL I (species need conservation action)</b>			
Mountain plover ( <i>Charadrius montanus</i> )	Summer/Breeder	Not Expected	Eight Miles to East/None
Greater sage-grouse ( <i>Centrocercus urophasianus</i> )	Resident/Breeder	Uncommon	Historic Breeder
McCown's longspur ( <i>Calcarius mccownii</i> )	Summer/Breeder	Uncommon	Uncommon Breeder
Baird's sparrow ( <i>Ammodramus bairdii</i> )	Summer/Observed	Not Expected	None
Ferruginous hawk ( <i>Buteo regalis</i> )	Resident/Breeder	Common	Breeder
Brewer's sparrow ( <i>Spizella breweri</i> )	Summer/Breeder	Common	Common Breeder
Sage sparrow ( <i>Amphispiza belli</i> )	Summer/Breeder	Not Expected	None
Swainson's hawk ( <i>Buteo swainsoni</i> )	Summer/Breeder	Common	Breeder
Long-billed curlew ( <i>Numenius americanus</i> )	Summer/Observed	Uncommon	Rare Spring Migrant
Short-eared owl ( <i>Asio flammeus</i> )	Resident/Breeder	Uncommon	Historic Breeder
Peregrine falcon ( <i>Falco peregrinus</i> )	Resident/Observed	Not Expected	Rare Migrant
Burrowing owl ( <i>Athene cunicularia</i> )	Summer/Breeder	Common	Uncommon Breeder
Bald eagle ( <i>Haliaeetus leucocephalus</i> )	Resident/Breeder	Common	Occasional Winter Resident
Upland sandpiper ( <i>Bartramia longicauda</i> )	Summer/Breeder	Uncommon	Uncommon Breeder
<b>LEVEL II (species need monitoring)</b>			
Cassin's kingbird ( <i>Tyrannus vociferans</i> )	Never Recorded	Not Expected	None
Lark bunting ( <i>Calamospiza melanocorys</i> )	Summer/Breeder	Common	Common Breeder
Dickcissel ( <i>Spiza americana</i> )	Summer/Observed	Not Expected	None
Chestnut-collared longspur ( <i>Calcarius ornatus</i> )	Summer/Breeder	Uncommon	Uncommon Breeder
Black-chinned hummingbird ( <i>Archilochus alexandri</i> )	Never Recorded	Not Expected	None
Pygmy nuthatch ( <i>Sitta pygmaea</i> )	Never Recorded	Not Expected	None
Marsh wren ( <i>Cistothorus palustris</i> )	Never Recorded	Not Expected	None
Western bluebird ( <i>Sialia mexicana</i> )	Summer/Breeder	Not Expected	None
Sage thrasher ( <i>Oreoscoptes montanus</i> )	Summer/Breeder	Common	Uncommon Breeder
Grasshopper sparrow ( <i>Ammodramus savannarum</i> )	Summer/Breeder	Common	Common Breeder
Bobolink ( <i>Dolichonyx oryzivorus</i> )	Summer/Observed	Not Expected	None
Common loon ( <i>Gavia immer</i> )	Summer/Observed	Not Expected	Uncommon Migrant

**Table S4-9. Migratory Bird Species of Management Concern in Wyoming: Their Regional Status, and Expected and Actual Occurrence on or Near the West Jacobs Ranch LBA Tract (Continued).**

<b>Species<sup>1</sup> (Scientific Name)</b>	<b>Seasonal Status/Breeding Records in Northeastern WY<sup>1</sup></b>	<b>Historical Occurrence in Vicinity of the LBA<sup>2</sup></b>	<b>Occurrence and Status in the LBA tract<sup>3</sup></b>
<b>LEVEL II (species need monitoring)</b>			
Black-billed cuckoo ( <i>Coccyzus erythrophthalmus</i> )	Never Recorded	Not Expected	None
Red-headed woodpecker ( <i>Melanerpes erythrocephalus</i> )	Summer/Breeder	Not Expected	Uncommon Migrant
Yellow-billed cuckoo ( <i>Coccyzus americanus</i> )	Summer/Observed	Not Expected	None
Eastern screech-owl ( <i>Megascops asio</i> )	Never Recorded	Not Expected	None
Western screech-owl ( <i>Megascops kennicottii</i> )	Never Recorded	Not Expected	None
Western scrub-jay ( <i>Aphelocoma californica</i> )	Never Recorded	Not Expected	None
Loggerhead shrike ( <i>Lanius ludovicianus</i> )	Summer/Breeder	Common	Breeder
Vesper sparrow ( <i>Pooecetes gramineus</i> )	Summer/Breeder	Common	Common Breeder
Lark sparrow ( <i>Chondestes grammacus</i> )	Summer/Breeder	Uncommon	Breeder
Ash-throated flycatcher ( <i>Myiarchus cinerascens</i> )	Summer/Observed	Not Expected	None
Bushtit ( <i>Psaltirparus minimus</i> )	Never Recorded	Not Expected	None
Merlin ( <i>Falco columbarius</i> )	Resident/Breeder	Uncommon	Uncommon Migrant
Sprague's pipit ( <i>Anthus spragueii</i> )	Never Recorded	Not Expected	None
Barn owl ( <i>Tyto alba</i> )	Summer/Observed	Not Expected	None

<sup>1</sup> Latilong 13 – Atlas of Birds, Mammals, Amphibians, and Reptiles in Wyoming (Cеровski et al. 2004).

<sup>2</sup> Historical Occurrence/Status in the West Jacobs Ranch LBA survey area is based on records from annual monitoring conducted at the Jacobs Ranch and Black Thunder mines from 1993 through 2007.

<sup>3</sup> Sighting records were derived from actual occurrence on or within ½ mile of the LBA tract and the Alternative 2 tract configuration area or from observations related to Jacobs Ranch and Black Thunder mines' baseline and annual monitoring.

species that historically have been recorded, or are suspected of nesting in the West Jacobs Ranch general analysis area include the Greater sage-grouse, McCown's longspur, ferruginous hawk, Brewer's sparrow, Swainson's hawk, short-eared owl, burrowing owl, upland sandpiper, lark bunting, chestnut-collared longspur, sage thrasher, grasshopper sparrow, loggerhead shrike, vesper sparrow, lark sparrow, and merlin. Other species documented less often in and that have only been observed as migrants the area include the long-billed curlew and bald eagle.

#### **S4-10.7 Other Species**

Wildlife surveys completed specifically for the West Jacobs Ranch LBA Tract, for the adjacent mines, as well as biological research projects in the eastern Powder River Basin have documented numerous other wildlife species that inhabit the region, including various waterfowl, shorebirds and other non-game birds, amphibians, reptiles, and aquatic species. All of these species were

generally common inhabitants of the area and were not considered to be of specific concern to state or federal agencies. The total bird species observed for the West Jacobs Ranch LBA, including those species already discussed, consists of; 27 waterfowl, 39 shorebirds, 14 raptors, five owls, four game birds and 53 other birds.

Under current natural conditions the LBA tract provides limited and marginal aquatic habitat for waterfowl and shorebirds. This habitat is primarily provided during spring migration as ponds, playas and ephemeral streams. These waterbodies generally dry up during the summer. With the addition of water being produced from the CBNG wells in the area, an increase in habitat for waterfowl and shorebirds has occurred. Waterfowl and shorebird species use of the area increased on the ponds and drainages filled by the CBNG wells, but has recently begun to decrease as CBNG water discharges have decreased. Broods of the widgeon (*Anus americana*), gadwall (*Anus strepera*), mallard (*Anus platyrhynchos*), northern shoveler (*Anus clypeata*), Canada goose (*Branta canadensis*), killdeer (*Charadrius vociferous*), and American avocet (*Recurvirostra americana*) were observed during 2007.

The lack of deepwater habitat and extensive and persistent water sources limits the presence and diversity of fish and other aquatic or semi-aquatic species. As discussed above, water discharged from CBNG wells has enhanced the water supply within some drainages in the general Wright analysis area, including Black Thunder Creek and its tributaries, which has increased potential habitat for some aquatic species. However, those temporarily-enhanced areas are still relatively limited and/or isolated in nature, and no perennial drainages are present in the general analysis area. CBNG production and the associated surface discharge of groundwater from coal seams has and will continue to decrease over time and eventually end, returning streamflows to natural conditions.

Fish species would not normally be found on the LBA tract as all bodies of water and drainages are ephemeral and tend to dry up by summer or fall. Fish habitat has been created by perennial flows established from CBNG water discharges. However, the CBNG wells must produce sufficient and perennial flows of water and numerous dams would have to be breached for fish species to migrate up the North Prong Little Thunder Creek and Dry Fork Little Thunder Creek and survive. There is little likelihood of any sensitive fish species migrating onto the LBA tract since they are not known to exist downstream within a reasonable distance.

The West Jacobs Ranch LBA provides habitats for a variety of reptiles and amphibians. In all, nine reptiles and five amphibians have been recorded on the LBA or within several miles. The bottomland and aquatic sites provide habitat for many of the amphibian species while the uplands provide habitat for the reptile species. The 14 species recorded during past surveys include: the tiger salamander (*Ambystoma tigrinum*), plains spadefoot (*Scahiopus bombifrons*), great plains toad (*Bufo cognatus*), boreal chorus frog (*Pseudacris*

*triseriata maculata*), northern leopard frog (*Rana pipiens*), short-horned lizard (*Phrynosoma douglassi*), northern sagebrush lizard (*Sceloporus graciosus graciosus*), plains hognose snake (*Heterodon nasicus nasicus*), wandering garter snake (*Thamnophis elegans vagrans*), red-sided garter snake (*Thamnophis sirtalis parietalis*), prairie rattlesnake (*Crotalus viridis viridis*), bullsnake (*Pituophis melanoleucas sayi*), western plains garter snake (*Thamnophis radix haydeni*), and eastern yellowbelly racer (*Coluber constrictor flaviventris*). In 2007, the only reptiles or amphibians that were encountered on the LBA tract were the boreal chorus frog, leopard frog, sagebrush lizard, prairie rattlesnake, and wandering garter snake. The scarcity of mesic habitat elsewhere within most of the LBA area reduces the potential of the area to attract numerous species, particularly amphibians.

#### **S4-11 LAND USE AND RECREATION**

The surface estate on the West Jacobs Ranch LBA Tract as applied for and the area added under Alternative 2 (the BLM study area) is privately owned. The surface ownership of the West Jacobs Ranch tract is shown in detail on Figure 3-43 and the distribution of surface ownership is given in Table 3-14 in the WAC DEIS document. Livestock grazing is the primary land use within the BLM study area for the LBA tract, while oil and gas production, wildlife habitat, and recreation are secondary land uses.

Areas of disturbance within and near the West Jacobs Ranch tract include roads, oil and gas wells and associated production facilities, surface mine-related facilities and activities, and activities associated with ranching operations. State Highway 59, which runs north-south, is located about 2½ miles west of the LBA tract, and State Highway 450, which runs east-west, borders the southern edge of the West Jacobs Ranch tract and it provides public and private access within and near the tract. Several unnamed two-track roads also traverse and provide private access within and near the proposed lease area. The Burlington Northern Santa Fe & Union Pacific (BNSF & UP) railroad right-of-way (ROW) is adjacent to the eastern edge of the Hilight Road ROW (Figure 3-1 in the WAC DEIS document).

The oil and gas estate within the West Jacobs Ranch LBA Tract as applied for and the area added under Alternative 2 is federally and privately owned, with the majority (approximately 74 percent) being privately owned. The ownership of the West Jacobs Ranch oil and gas estate is shown in the WAC DEIS document on Figure 3-49. A listing of the current federal oil and gas lessees of record is included as Table 3-18 in the WAC DEIS document.

According to the Wyoming Oil and Gas Conservation Commission (WOGCC) records as of May 14, 2008, there were two oil wells on lands included in the West Jacobs Ranch LBA Tract as proposed and the lands added under Alternative 2 that were producing or capable of producing, and nine oil wells and one conventional gas well had been plugged and abandoned (refer to Figure 3-49 in the WAC DEIS document for locations). The most recent

conventional oil and gas well in the general analysis area was drilled in 1990 (WOGCC 2008a). Conventional oil and gas wells capable of production within the BLM study area for the West Jacobs Ranch tract are listed in Appendix E of the WAC DEIS document.

According to the WOGCC records as of May 14, 2008, 78 coal bed natural gas (CBNG) wells were producing and 11 CBNG wells were shut-in within the lands encompassed by the West Jacobs Ranch LBA Tract as applied for and the lands added under Alternative 2 (refer to Figure 3-49 in the WAC DEIS document for locations). Extensive CBNG development has occurred on lands surrounding the tract as well. CBNG wells capable of production within the BLM study area for the West Jacobs Ranch LBA Tract are listed in Appendix E of the WAC DEIS document.

Coal mining is a dominant land use to the north, east, and south of the LBA tract. The Black Thunder, Jacobs Ranch, and North Antelope Rochelle mines form a group of contiguous or nearly contiguous surface coal mines located in Campbell and Converse counties (Figure S-1). The North Hilight Field, South Hilight Field, West Hilight Field, West Jacobs Ranch, North Porcupine, and South Porcupine LBA Tracts being evaluated in the WAC DEIS are in this group of mines (Tables 1-1 and 1-2 in the WAC DEIS document). Coal production from the three applicant mines involved in the WAC lease applications (Jacobs Ranch, Black Thunder, and North Antelope Rochelle) increased by roughly 59 percent between 1998 and 2007 (from approximately 120.1 million tons in 1998 to 191.3 million tons in 2007). Since decertification, nine coal leases (the Jacobs Ranch, West Black Thunder, North Antelope/Rochelle, Powder River, Thundercloud, North Jacobs Ranch, NARO South, Little Thunder, and NARO North LBA Tracts) have been issued within this group of mines.

Big game hunting is the principal recreational land use within the LBA tract's general analysis area. Pronghorn and mule deer are the most common big game species within the area. On private lands, hunting is allowed only with landowner permission. Land ownership within the PRB is largely private (approximately 80 percent), with some private landowners permitting sportsmen to cross and/or hunt on their land. There has been a trend over the past two to three decades towards a substantial reduction in private lands that are open and reasonably available for hunting. Access fees continue to rise and many resident hunters feel these access fees are unreasonable. This trend has created problems for the WGFD in their attempt to distribute and control harvest at optimal levels, as well as for sportsmen who desire access to these animals (WGFD 2007a). Pronghorn, mule deer, and white-tailed deer occur on or adjacent to the LBA tract. Sage grouse, mourning dove, waterfowl, rabbit, and coyote may be also harvested in the vicinity, and some trapping of red fox may also occur.

Specific details regarding big game herd management objectives within and near the general Wright analysis area are contained in Wyoming Game and Fish Department's (WGFD's) 2007 Big Game Herd Unit Job Completion Reports

for the Casper and Sheridan Regions (WGFD 2007a). The WGFD classifies the entire general Wright analysis area as yearlong (a population or substantial portion of a population of animals makes general use of this habitat on a year-round basis but may leave the area under severe conditions on occasion) and winter/yearlong range (a population or a portion of a population of animals makes general use of this habitat on a year-round basis, with a significant influx of additional animals onto this habitat from other seasonal ranges in the winter) for pronghorn. The general analysis area for the West Jacobs Ranch tract is within the Hilight Herd Unit (Hunt Area 24). In post-season 2007, the WGFD estimated the Hilight Herd Unit population to be approximately 12,397 animals, which is above the WGFD objective of 11,000 (WGFD 2007a).

The West Jacobs Ranch LBA Tract as applied for and the area added by Alternative 2 are located within the WGFD Thunder Basin Mule Deer Herd Unit (Hunt Area 21). No crucial or critical mule deer ranges or migration corridors occur on or within several miles of the tract's general analysis area. Crucial range is defined as any particular seasonal range or habitat component that has been documented as the determining factor in a population's ability to maintain and reproduce itself at a certain level. The WGFD estimated the 2007 post-season mule deer population in this herd unit at 20,980, which is slightly above the current objective of 20,000 (WGFD 2007a).

A resident elk herd resides in the Rochelle Hills, which are located just east of the West Jacobs Ranch LBA Tract. Elk do wander from the protection of the Rochelle Hills to forage in native and reclaimed grasslands in the vicinity of the tract's general analysis area. No portion of the tract's general analysis area is classified by the WGFD as within normal elk use range. As more lands adjacent to the Rochelle Hills are reclaimed from mining, elk are shifting their winter use to these areas. The WGFD has designated an approximately 5 square mile area on reclaimed lands within the Jacobs Ranch Mine permit area as crucial winter habitat for the Rochelle Hills elk herd (Odekoven 1994). Rio Tinto Energy America (RTEA), owner of the Jacobs Ranch Mine, and the Rocky Mountain Elk Foundation (RMEF) finalized a formal agreement that created the Rochelle Hills Conservation Easement. The easement contains nearly 1,000 acres, with 75 percent of that total comprised of reclaimed mining lands on RTEA's Jacobs Ranch Mine. The easement acreage was donated to RMEF by RTEA to ensure that the reclaimed land continues to be used as grazing land and wildlife habitat for the extended future (RMEF 2007). Elk have been observed within the general Wright analysis area in recent years, but they are typically restricted to the pine breaks east of the Cordero Rojo, Coal Creek, and Jacobs Ranch mines. The WGFD estimated the 2007 post-season elk population for the Rochelle Hills Herd Unit at 600, which is 50 percent above the current objective of 400 animals (WGFD 2007a).

White-tailed deer are generally not managed separately by the WGFD, but are managed and hunted in conjunction with mule deer. The population occupying Hunt Areas 10 and 21 is part of the Central White-tailed Deer Herd Unit. White-tailed deer are seldom observed within the general Wright analysis

area due to their preference for riparian woodlands and irrigated agricultural lands. The WGFD classifies the entire general Wright analysis area as out of the normal white-tailed deer use range. A narrow corridor along Antelope Creek south of the general Wright analysis area is classified as yearlong white-tail range. The WGFD does not have population estimates for this herd unit due to the challenges of obtaining adequate classifications in many hunt areas within the herd unit.

Under natural conditions, the general analysis area for the West Jacobs Ranch LBA Tract provides very limited aquatic habitat for waterfowl and shorebirds. The natural aquatic habitat is primarily provided during spring migration as ponds, playas and ephemeral stream flows. These water bodies generally dry up during the summer. With the relatively recent phenomenon of additional surface water being produced from CBNG production within and upstream of the tract's general analysis area, aquatic habitat for waterfowl and shorebirds has improved somewhat. However, those enhanced areas are still relatively limited and/or isolated in nature. Despite the recent influx of water into the general Wright analysis area, many channels are still reduced to isolated, shallow pools in the summer. Waterfowl and shorebird observations have primarily consisted of relatively low numbers of common species, often restricted to spring migration. Few broods have been recorded in the area during baseline or annual monitoring studies due to limited and unreliable water resources in the area. Avian species typically associated with aquatic habitats in the general analysis area include, but are not limited to, the mallard duck (*Anas platyrhynchos*), killdeer (*Charadrius vociferus*), and red-winged blackbird (*Agelaius phoeniceus*).

#### **S4-12 CULTURAL RESOURCES**

The entire general analysis area for the West Jacobs Ranch LBA Tract has been intensively surveyed for cultural resources at a Class III level. Cultural resource inventories in this area began in 1975 and continued with numerous projects associated with oil and gas field development as well as surface mining operations throughout the 1990s and 2000s. Jacobs Ranch Coal Company (JRCC) contracted with GCM Services, Inc., of Butte, Montana to perform Class I inventories of all previous surveys and Class III surveys of all unsurveyed areas within the general analysis area for the West Jacobs Ranch LBA Tract. GCM completed the Class III level inventory of the tract's general analysis area in the summer of 2006 (reports not yet accessioned by the SHPO), which included a total of approximately 6,200 acres.

A review of the Wyoming Cultural Resource Information System (WYCRIS) produced information from nine large-scale (40 acres or larger) Class III cultural resource inventory projects that have been conducted within the general analysis area for the West Jacobs Ranch tracts. In addition, several small-scale inventories were reported in the area. Small-scale inventories include seismic grids, well pads, access routes, utility corridors and drill holes

associated with oil and gas development. Both large-scale and small-scale projects are listed in the inventory summary table (Table S4-10).

**Table S4-10. Summary of Cultural Resource Inventories in the General Analysis Area for the West Jacobs Ranch LBA Tract.**

<b>Accession No.</b>	<b>Intensity Level &amp; Project Type</b>	<b>Location of Block Survey</b>	<b>Class III Block Acres</b>	<b>Study Year</b>
not accessioned	Class III block	T43N, R71W, Section 3, all	640	2007
5 1240 0	Class III linear	T43N, R71W, Section 3 - linear survey	0	2005
1 334 0	Class III block	T43N, R71W, Section 3, all	640	2001
unaccessioned	Class III block	T43N, R71W, Section 3, S1/2, NE1/4, S1/2 NW1/4	560	2002
unaccessioned	Class III block	T43N, R71W, Section 4, all	640	2007
1 334 0	Class III block	T43N R71W Section 4, N1/2	320	2001
6 778	Class III comb. block/linear	T43N, R71W, Section 4, NE1/4 SW1/4	2.5	2006
unaccessioned	Class III block	T43N, R71W, Section 5, all	640	2007
78 17 0	Class III block (core hole)	T43N R71W Section 5, Center- south section line	1	1978
unaccessioned	Class III block	T43N, R71W, Section 6, E1/2	320	2007
1 1537 0	Class III block	T43N R71W Section 6, S1/2	320	2001
98 898 0	Class III linear	T43N, R71W, Section 6 - linear survey	0	1998
97 436 0	Class III comb. block/linear	T43N, R71W, Section 6 - linear survey	0	1997
82 125 0	Class III comb. block/linear	T43N, R71W, Section 6 - linear survey	0	1982
unaccessioned	Class III block	T44N, R71W, Section 15, all	640	2007
1 1453 0	Class III block	T44N, R71W, Section 15, E1/2 SW1/4, SW1/4 SW1/4	120	2001
81 2220 0	Class III comb. block/linear	T44N, R71W, Section 15, NW1/4 SW1/4	40	1981
78 185 0	Class II (?) comb. block/linear	T44N, R71W, Section 15 - old Class II survey	0	1978



*Supplementary Information on the Affected Environment*

**Table S4-10. Summary of Cultural Resource Inventories in the General Analysis Area for the West Jacobs Ranch LBA Tract (Continued).**

<b>Accession No.</b>	<b>Intensity Level &amp; Project Type</b>	<b>Location of Block Survey</b>	<b>Class III Block Acres</b>	<b>Study Year</b>
75 71 0	Class II linear	T44N R71W Section 15 - linear survey	0	1975
unaccessioned	Class III block	T44N, R71W, Section 16, E1/2, SW1/4	480	2007
80 1696 0	Class III block	T44N, R71W, Section 16, all	640	1980
80 1696 0	Class III block	T44N, R71W, Section 16, all	640	1980
1 1453 0	Class III block	T44N, R71W, Section 17, E1/2, E1/2 W1/2, SW1/4 SW1/4	520	2001
1 728	unknown	T44N, R71W, Section 17, unknown	unknown	2001?
unaccessioned	Class III block	T44N, R71W, Section 19, S1/2 SE1/4	80	2007
1 1453 0	Class III block	T44N, R71W, Section 19, E1/2	320	2001
90 489 0	Class III comb. block/linear	T44N, R71W, Section 19, C NE1/4 SW1/4	10	1990
84 789 0	Class III comb. block/linear	T44N, R71W, Section 19, W1/2	320	1984
unaccessioned	Class III block	T44N, R71W, Section 20, all	640	2007
1 1453 0	Class III block	T44N, R71W, Section 20, NENE	40	2001
unaccessioned	Class III block	T44N R71W Section 21, all	640	2007
unaccessioned	Class III block	T44N, R71W, Section 22, all	640	2007
1 1453 0	Class III block	T44N, R71W, Section 22, E1/2 NW1/4, SW1/4 NW1/4	120	2001
81 380 0	Class III comb. block/linear	T44N, R71W, Section 22, NWNW	40	1981
81 2220 0	Class III comb. block/linear	T44N, R71W, Section 22, none	0	1981
78 185 0	Class II (?) comb. block/linear	T44N, R71W, Section 22 - old Class II survey	0	1978

**Table S4-10. Summary of Cultural Resource Inventories in the General Analysis Area for the West Jacobs Ranch LBA Tract (Continued).**

<b>Accession No.</b>	<b>Intensity Level &amp; Project Type</b>	<b>Location of Block Survey</b>	<b>Class III Block Acres</b>	<b>Study Year</b>
75 71 0	Class II linear	T44N, R71W, Section 22 - Class II linear survey	0	1975
99 1820	unknown	T44N, R71W, Section 22, unknown	unknown	1999
unaccessioned	Class III block	T44N, R71W, Section 22, SE1/4	160	2006
unaccessioned	Class III block	T44N, R71W, Section 27, all	640	2007
5 1240 0	Class III linear	T44N, R71W, Section 27 - linear survey	0	2005
75 71 0	Class II linear	T44N, R71W, Section 27 - Class II linear survey	0	1975
unaccessioned	Class III block	T44N, R71W, Section 27, NE1/4, N1/2 SE1/4	240	2006
unaccessioned	Class III block	T44N, R71W, Section 28, all	640	2007
unaccessioned	Class III block	T44N, R71W, Section 29, all	640	2007
1 1346 0	Class III linear	T44N, R71W, Section 29 - linear survey	0	2001
1 1453 2	Class III linear	T44N, R71W, Section 29 - linear survey	0	2001
unaccessioned	Class III block	T44N, R71W, Section 30, E1/2	320	2007
1 1453 0	Class III block	T44N, R71W, Section 30, E1/2, SW1/4	480	2001
87 14 0	Class III linear	T44N, R71W, Section 30 - linear survey	0	1987
84 789 0	Class III comb. block/linear	T44N, R71W, Section 30, NW1/4	160	1984
unaccessioned	Class III block	T44N, R71W, Section 31, E1/2	320	2007
1 1453 0	Class III block	T44N, R71W, Section 31, all	640	2001
82 125 0	Class III comb. block/linear	T44N, R71W, Section 31, ENWSW, WWNESW	40	1982

*Supplementary Information on the Affected Environment*

**Table S4-10. Summary of Cultural Resource Inventories in the General Analysis Area for the West Jacobs Ranch LBA Tract (Continued).**

<b>Accession No.</b>	<b>Intensity Level &amp; Project Type</b>	<b>Location of Block Survey</b>	<b>Class III Block Acres</b>	<b>Study Year</b>
unaccessioned	Class III block	T44N, R71W, Section 32, all	640	2007
unaccessioned	Class III block	T44N, R71W, Section 33, all	640	2007
5 1240 0	Class III linear	T44N, R71W, Section 34 - linear survey	0	2005
4 91 0	Class III comb. block/linear	T44N, R71W, Section 34 - linear survey	0	2003
1 334 0	Class III block	T44N, R71W, Section 34, all	640	2001
95 4 0	Class III block	T44N R71W Section 34, ENESE	20	1995
75 71 0	Class II linear	T44N, R71W, Section 34 - linear survey	0	1975
unaccessioned	Class III block	T44N, R71W, Section 34, E1/2	320	2002

Note: Some project areas may overlap in spatial extent. This may or may not reflect overlapping pedestrian surveys. Overlapping surveys may occur from unrelated projects (e.g., CBNG and coal mine projects on the same parcel), which occur close in time, delayed report accession, file search error, or intentional re-inspection of a previously surveyed area, due to unevaluated sites, project age, etc.

The Class I review of the general analysis area for the West Jacobs Ranch LBA Tract identified 13 previously recorded, documented cultural sites, while 18 new cultural properties were identified during the 2006 Class III surveys. Of these 31 total sites, 16 are historic, seven are prehistoric, one contains both historic and prehistoric components, and seven sites are rock cairns of indeterminate age and cultural affiliation. The historic sites consist primarily of homesteads and include a ranch complex and a stock herder's camp. The prehistoric sites consist of lithic scatters, stone circles or tipi ring sites, and rock cairns. The multi-component site consists of an historic corral complex and a prehistoric rock alignment.

Twenty-five of these 31 recorded cultural properties have not been reviewed and evaluated by the State Historic Preservation Office (SHPO) in terms of their National Register of Historic Places (NRHP) eligibility. Of these, 23 sites are recommended *not eligible* by the recorders and are unlikely to be determined significant. The other two unevaluated cultural properties are prehistoric sites that may lack sufficient information for the SHPO to make an eligibility determination. Of the 31 total sites, six have been reviewed and determined *not eligible* for the NRHP by the SHPO. There are no sites within the general analysis area for the West Jacobs Ranch LBA Tract considered eligible for the NRHP; however, significance determinations for these sites will have to be

made by the lead agency and SHPO. Table S4-11 lists the cultural sites, the site type, the NRHP status (eligible, not eligible, or undetermined), the recommended action, and the recorder's affiliation.

**Table S4-11. Cultural Resource Sites in the General Analysis Area for the West Jacobs Ranch LBA Tract.**

<b>Site Number - Type</b>	<b>NRHP Status</b>	<b>Recorder's Affiliation</b>
<b>Prehistoric sites</b>		
48CA0366 - Lithic Scatter	NE	Greer
48CA4095 - Lithic Scatter	NE consultant, NR	GCM
48CA4097 - Lithic Scatter	NE consultant, NR	GCM
48CA2420 - Stone Rings	Unknown	Pronghorn
48CA6776 - Stone Ring	NE consultant, NR	GCM
48CA6780 - Stone Ring	NE consultant, NR	GCM
48CA2418 - Cairns	Unknown	Pronghorn
<b>Historic sites</b>		
48CA0496 - Homestead	NE consultant, NR	Pronghorn
48CA3559 - Homestead	NE	GCM
48CA4220 - Homestead	NE consultant, NR	GCM
48CA6350 - Homestead	NE	GCM
48CA6353 - Homestead	NE	GCM
48CA6354 - Homestead	NE	GCM
48CA6779 - Homestead	NE consultant, NR	GCM
48CA6788 - Homestead	NE consultant, NR	GCM
48CA6789 - Homestead	NE consultant, NR	GCM
48CA6790 - Homestead	NE consultant, NR	GCM
48CA6791 - Homestead	NE consultant, NR	GCM
48CA6792 - Homestead	NE consultant, NR	GCM
48CA6793 - Homestead	NE consultant, NR	GCM
48CA0391 - Stockherding Camp	NE	BLM
48CA6777 - Ranch	NE consultant, NR	GCM
48CA6787 - Ranch	NE consultant, NR	GCM
<b>Multi-component sites</b>		
48CA4096 Drivelines, Corals	NE consultant, NR	GCM
<b>Unknown sites</b>		
48CA6778 - Cairn	NE consultant, NR	GCM
48CA6781 - Cairn	NE consultant	GCM
48CA6782 - Cairn	NE consultant	GCM
48CA6783 - Cairn	NE consultant	GCM
48CA6784 - Cairn	NE consultant	GCM
48CA6785 - Cairn	NE consultant	GCM
48CA6786 - Cairn	NE consultant	GCM

NE = Site determined Not Eligible for NRHP by the SHPO.

NE consultant, NR = Site recommended Not Eligible by recorder, but a determination is not yet made by the SHPO.

Unknown = NRHP status has not been determined.